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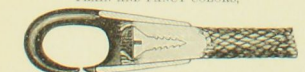
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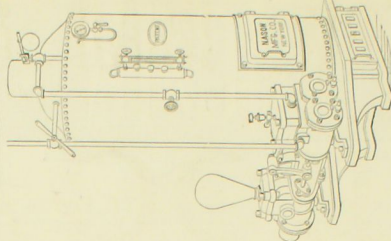
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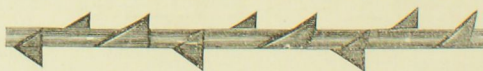
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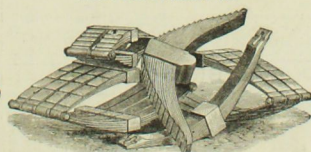
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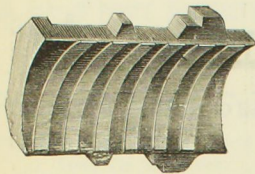
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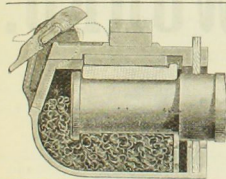
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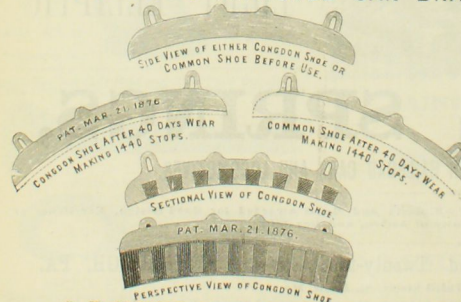


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About 2,000 of them are at work on the E. & T. H. C. & E. I. C. R. I. & P. T. H. & I. railroads since Dec. 1. The two first named roads have adopted it wholly for their freight cars. This coupling carries its own "stick" and with it the "Bossons" can couple cars with their "Kids" on Full size working models at W. V. PERRY'S (General Agent), South Clark Street, Chicago, Ill.

CRANE BROTHERS MFG. CO.

Offices, No. 10 N. Jefferson St., Chicago.

MANUFACTURERS OF

WROUGHT IRON PIPE,

Brass and Iron Goods

For Steam and Gas Fitters and Engine Builders,

CAST IRON and MALLEABLE IRON FITTINGS

Steam Pumps, Injectors, &c.,

Hollow Stay-Bolt Iron, Babbitt Metal, &c.

MALLEABLE IRON CASTINGS,

GRATE BARS, &c., &c.

JOYCE & CRIDLAND,

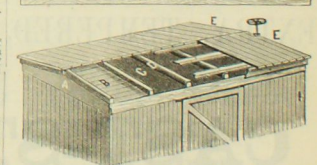
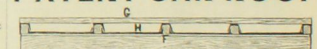
Cor. Canal and Fourth,
DAYTON, O.We represent here a cut of our Com
pound

Lever Jack,

OF GREAT POWER.

Its capacity is 12 to 15 tons with two men.
We make out one size, a two-inch round bar.
Height, 29 inches.

WINSLOW'S PATENT CAR ROOF



A Carline or Main Rafter, B Sub or under boarding, C Asphalt Felt, and when on Car painted with imperishable Asphalt paint, D Felt Can or Sub Rafter, E Upper board roof, F Sub Rafter, G Stringers on Sub Rafter, H Air Space between the Felt and upper board roof. This roof must come into general use by Railway Companies and Manufacturers of stock and Freight Cars for two reasons: CREATENESS and DURABILITY, as it can be furnished on the cars at the cost of a first-class double board roof, and is more durable than the best metallic roof, being thoroughly protected by the upper and lower boarding and the FELT, which is treated in its manufacture with ASPHALT and painted with the same imperishable material, which, not being affected by either heat or cold, must last the ordinary life of a car.

MANUFACTURED BY
A. P. WINSLOW & CO.,
CLEVELAND, OHIO.

[August, 1881.]

CO.,

ANY,

born Street, Chicago.

RIGHT COUPLING.

RS MFG. CO.

erson St., Chicago.

on Goods

BLE IRON FITTINGS

jectors, &c.,

Babbitt Metal, &c.

CASTINGS,

RS, &c., &c.

LAND, and

anal and Fourth,

YTON, O.

Send here a cut of our

er Jack,

GREAT POWER.

city in 20 to 30 times with

out one size, a two-inch

height, 30 inches.

OW'S

R ROOF

or under tinning. C. A.

ated with superlative

Butter. E. Upper board

on both patterns. If Air

and roof.

if used by Railway Com-

and Freight Cars for two

PLATT as it can be for

first-class double board

best portable roof, being

and lower boarding and

structure with a perfect

able material, which, not

it, must last the ordinary

W & CO.,

1880.

AUGUST, 1881.]

THE NATIONAL CAR-BUILDER.

iii

LOWE'S METALLIC PAINT COMPANY,

CHATTANOOGA, TENNESSEE,

MANUFACTURERS OF

LOWE'S METALLIC PAINT!

This Paint has now been before the public sufficiently long to establish its qualities as first-class Metallic Paint in every respect. It has covering properties superior to any other Metallic Paint made.

It takes about 18 per cent. less Oil than any other Metallic Paint.

It is absolutely free from Sulphates of every kind and description, which in many other Metallic Paints prove so injurious to Iron and Tin Roofs. It is manufactured in a very superior manner by being re-ground and carefully prepared, and is entirely available for inside finish when dark colors are desired. Its natural color is a Uniform Dark Blood Red. It is

Warranted not less than 55 per cent. Metallic Iron,

thus giving it a body excellent by no other Paint made.

Its Fire Proof properties are excellent, and houses constructed of wood, and especially shingle roofs, are very materially protected by application of this Paint.

It is not calcined nor burnt, consequently its color is unchangeable.

We have Freight arrangements to nearly every city in the United States and Canada, and would name Prices delivered.

Please read the Certificates hereto attached.

East Tennessee, Virginia & Georgia Railroad—Main Stem.

Office of General Superintendent, Knoxville, Tenn., April 18, 1881.

S. B. Lowe, Chattanooga, Tenn.:

Dear Sir: * * * I will say that this company is using it

both upon its Main Stem and Selma Division, and has found it

perfectly satisfactory, and equal to any Lehigh Brown that

we have used. It mixes well and spreads smoothly, and

finds it much the cheapest paint that I can use for freight

cars and such purposes. Very truly yours,

JNO. F. O'BRIEN, Gen'l Supt.

Wilkins, Post & Co., Engineers and Bridge Builders,

Atlanta, Ga., and 102 Broadway, N. Y.,

Atlanta, May 10, 1881.

S. B. Lowe, Chattanooga:

Dear Sir: We have been using your paint on all the iron

bridges that we are constructing on the M. & C. Georgia

Western, and other railroads through the South, and find it

of very superior quality requiring less oil and working with

ease, and having excellent covering properties.

Respectfully, WILKINS, POST & CO.,

Office of Peaslee, Gault & Co., Manufacturers of

White Lead, Colors, Ready Mixed Paints, etc.,

Louisville, Ky., April 15, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:

Dear Sir: * * * Your Metallic Paint has given perfect

satisfaction wherever we have placed it. In gridding we find

it takes from ten to twenty-five per cent. less oil than various

other brands of oxide of iron we have heretofore handled.

Very truly yours, PEASLEE, GAULT & CO.

King's Iron Bridge & Manufacturing Co.,

Cleveland, O., May 25, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:

Gentlemen: We find your paint of first-rate quality for our

use, and very economical. Yours truly,

KING BRIDGE CO.

Office of Scott & Co.,

Manufacturers of Scott's Sheet Iron Roofing,

Cincinnati, May 4, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:

Gentlemen: We consider it as good as any that we have

used during our experience of over nine years, and shall use

it largely. Yours, etc., SCOTT & CO.

W. G. Hyndman & Co.,

Manufacturers of Patent Sheet Iron Roofing,

Cincinnati, May 3, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:

Gentlemen: The paint which we received from you last

month has given us perfect satisfaction. We regard it as

the best iron ore paint that we have ever used.

Respectfully yours, W. G. HYNDMAN & CO.

P. S.—Please forward us immediately two (2) tons more on

our order. Wason Car and Foundry Co.,

Chattanooga, Tenn., May 3, 1881.

S. B. Lowe, City:

Dear Sir: For some time past we have been using the Lowe

Metallic Paint upon all the cars built at our shops, and, as it

gives entire satisfaction to our customers, it is our purpose to

continue the use of it. P. F. MORRILL, Sec'y.

Cincinnati, Hamilton & Dayton R. R. Co.,

Operating the

Dayton & Michigan, Cin'ti, Richmond & Chicago,

and C. H. & I. R. R.

W. H. H. Allison, Master Car-Builders,

Cincinnati, June 14, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:

Gentlemen: We have been using your Metallic Paint on

freight cars, at our shops, for the last four months, and find

it a better paint than we ever used for that purpose.

Yours respectfully, W. H. H. ALLISON.

Laboratory of Fred P. Dewey,

Chemist to Roane Iron Co.,

Chattanooga, Tenn., April 6, 1881.

S. B. Lowe, Esq.:

Dear Sir: I have given samples of your paint a careful

analysis with a special view of ascertaining if there is any

substance in it calculated to prove injurious to tin or iron

roofs, and am free to say that I find it remarkably free from

sulphides of every kind, or anything else that could prove in-

jurious to either tin or iron roofs. Yours respectfully,

FRED P. DEWEY, Ph. D., Analytical Chemist.

Office of Norton & Wieder,

Paints, Oils, Varnishes, Glass, Sash, Doors and Blinds,

St. Louis, May 20, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:

Gentlemen: We have used and sold—in the course of the

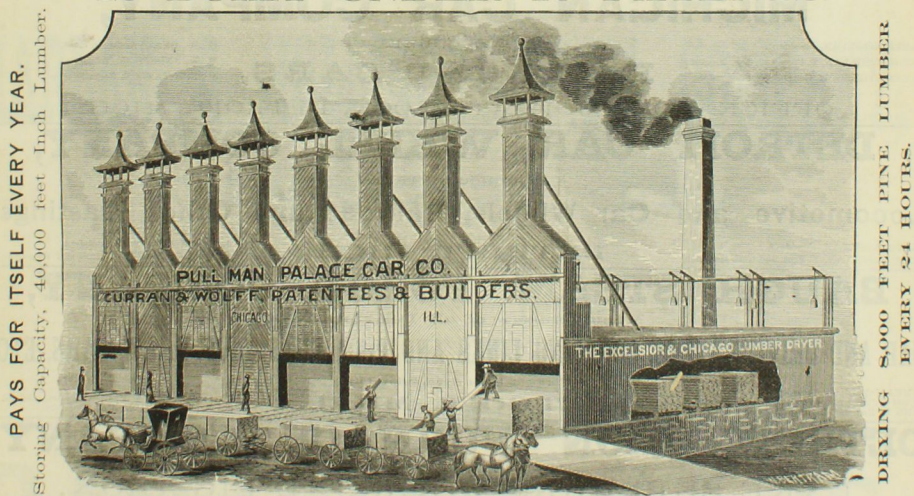
past year—enormous quantities of your Metallic Paint, and

we find that less oil is required for years than for other

Metallic Paints. Yours truly, NORTON & WIEDER.

THE EXCELSIOR AND CHICAGO LUMBER DRYER

IS BUILT UNDER 16 PATENTS.



RAILROAD COMPANIES AND CAR-BUILDERS WHO ARE USING THE EXCELSIOR AND CHICAGO LUMBER DRYER.

	No. of Dryers		No. of Dryers
Pullman Palace Car Company, Chicago	1	Atchison, T. & S. P. Railway, Topeka, Kan.	1
Wells & French Co., Chicago	1	Barnes & Smith Company, Dayton, O.	1
C. & S. W. Railroad, Chicago	1	Missouri Car & Foundry Co., St. Louis	1
First & Perry-Maryette R. R., Madison	1	Blair Bros., Huntingdon, Pa.	1
Pennsylvania Car Works, Detroit	1	U. S. Rolling Stock Co., Chicago	1
Michigan Car Company, Detroit	1		
Memphis & Charleston Railroad, Memphis	1		
Ohio & Erie Car Company, Jeffersonville, Ind.	1		
Indiana Car Company, Cambridge City, Ind.	1		
Haskell & Barker Company, Michigan City, Ind.	1		
Denver & Rio Grande Railway, Denver, Col.	1		

CURRAN & WOLFF, Proprietors and Builders, 39 and 41 FRANKLIN STREET, CHICAGO, ILL.

WASON CAR & FOUNDRY CO.,

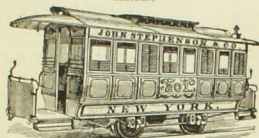
CHATTANOOGA, TENN.,

MANUFACTURERS OF

FREIGHT CARS,
CAR WHEELS,
AND
CASTINGS OF ALL KINDS.

GILL CAR
M'F'G CO.,
Columbus, Ohio.
Make the best CARS and WHEELS.

John Stephenson Co.,
LIMITED.



STREET CARS
AND OMNIBUSES,
47 East Twenty-Seventh St., New York.

ERIE CAR WORKS (LIMITED).

ERIE, PA.

Capacity 16 Cars Per Day.

FREIGHT CARS OF BEST MATERIAL, AND CONSTRUCTION A SPECIALTY.

H. M. CLAPEN, President.

J. N. ASHBURN, Secretary.

S. SHELDON, Engineer.

W. REISCHL, Ass't Eng'r.

CLEVELAND BRIDGE & CAR WORKS,

BUILDERS OF

BRIDGES AND ROOFS,

EITHER OF IRON OR WOOD, ALSO

FREIGHT AND STREET RAILWAY CARS,

WITH ALL DESIRABLE IMPROVEMENTS.

Manufacture Car Wheels and Castings of All Kinds.

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Works: Cor. Lake and Wason Sts., Cleveland, O.

LITCHFIELD CAR AND MACHINE COMPANY,
LITCHFIELD, ILLINOIS.

Manufacturers of all kinds of Passenger and Freight Equipment, both Wide and Narrow Gauge.

CAR WHEELS A SPECIALTY IN THE MACHINERY DEPARTMENT.

Special attention is given to furnishing Hoisting Engines, Pit Cars, Dumps, etc., etc., for Coal Mines, as well as building Stationary Engines and Boilers, and General Brass and Sheet-Iron Work.

PARDEE CAR WORKS.

WATSONTOWN, PA.,

PARDEE, SNYDER & CO., Limited, Proprietors,

MANUFACTURE



Mail, Baggage, Box, Gondola, Flat, Gravel, Ore, Coal, Mine and Hand Cars,
Kelley's Patent Turn-Tables and Centres for Wooden Turn-Tables,
Car Castings, Railroad Forgings, Rolling-Mill Castings,
Bridge Bolts and Castings.

We have in connection with our Car Works an extensive Foundry and Machine Shop, and are prepared to do a general
Machine Business.

ARIO PARDEE, Chairman.

H. F. SNYDER, Treasurer and General Manager.

O. LEISER, Secretary.

MICHIGAN CAR COMPANY,

Manufacturers of

RAILROAD CARS,

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HUGH McMILLAN, V. Pres. and Gen. Manager.

JAMES MCGREGOR, General Superintendent.

H. W. DYAR, Assistant Manager.

W. K. ANDERSON, Treasurer.

JOSEPH TAYLOR, Secretary.

OFFICE: NO. 2 MOFFAT BLOCK, DETROIT, MICH.

DETROIT CAR WHEEL COMPANY,

Manufacturers of

Locomotive and Car Wheels, Railroad and Other Castings,

JAMES McMILLAN, President.

HUGH McMILLAN, V. Pres. and Gen. Manager.

DETROIT, MICH.

J. H. WHITING, Superintendent.

W. K. ANDERSON, Secretary and Treasurer.

BAUGH STEAM FORGE COMPANY,

Manufacturers of all Descriptions of

CAR AND DRIVING AXLES, COUPLING LINKS AND PINS, SHAFTINGS, DRAW BARS, ETC.

Works on River Road, Below City,

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JAMES McMILLAN, President.
HUGH McMILLAN, V. President and Treasurer.
JOHN B. BAUGH, General Manager.

SAMUEL A. BAUGH, Superintendent.

W. K. ANDERSON, Secretary.

DETROIT IRON FURNACE COMPANY.

LAKE SUPERIOR CHARCOAL PIG IRON,

FOR CAR-WHEEL AND MALLEABLE USE.

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JAMES McMILLAN, President.

HUGH McMILLAN, Vice-Pres. and Treas.

LEE BURT, Manager.

E. C. WETMORE, Secretary.

[August, 1881.]

(LIMITED).

ON A SPECIALTY.

WORKS,

ROOFS,

Y CARS,

of All Kinds.

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COMPANY,

WORKS.

DEPARTMENT.

WORKS.

and Hand Cars,

Turn-Tables,

Castings,

as prepared to do a general

O. LEISER, Secretary.

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ANY,

Castings,

ANY,

BARS, ETC.

ANY.

ON.

ET, Manager.

ETMORE, Secretary.

AUGUST, 1881.]

THE NATIONAL CAR-BUILDER.

MIDDLETOWN CAR WORKS

MICHAEL SCHALL & ARTHUR KING, Proprietors,

MANUFACTURERS OF

RAILWAY AND MINE CARS.

SPECIAL ATTENTION GIVEN TO CAR REPAIRS.

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LEHIGH CAR, WHEEL & AXLE WORKS,

McKEE & FULLER,

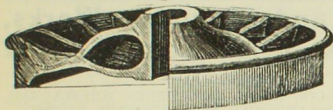
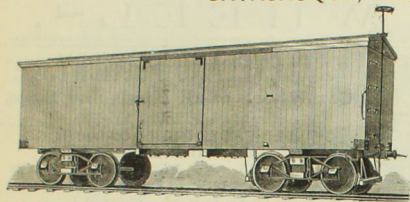
CATASAUQUA, PA.,

MANUFACTURERS OF
Broad and Narrow-Gauge
FREIGHT AND COAL CARS
OF EVERY DESCRIPTION.

WHEELS
For Freight, Locomotive,
Truck, Tender, and
Passenger Service,
Hammered Axles,
AND OTHER FORGINGS.

CAPACITY:
16 Box-Cars Per Day.
250 Wheels Per Day.

Wheels Fitted to Axles, and Prices
Furnished on Application.



WASON

MANUFACTURING COMPANY,

SPRINGFIELD, MASS.,

BUILDERS OF

RAILWAY CARS OF ALL DESCRIPTIONS,

CAR WHEELS AND RAILWAY CASTINGS.

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G. C. FISK, President.

SAMUEL HARLAN, Jr., Pres't.

J. T. GAUSE, Vice-Pres't.

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THE

HARLAN & HOLLINGSWORTH COMPANY,

WILMINGTON, DEL.

ESTABLISHED IN 1836.

MANUFACTURERS OF EVERY DESCRIPTION OF

RAILROAD CARS.

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VANDERBILT & HOPKINS,
RAILROAD TIES, CAR AND RAILROAD
LUMBER, WHITE AND YELLOW
PINE AND OAK.

No. 120 Liberty St., New York.
Also North Carolina Pine Boards. Plank and Dimension
Lumber to Order.
GENERAL RAILROAD SUPPLIES.

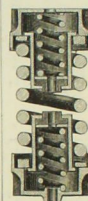
J. M. JONES & CO.,
SCHENECTADY, NEW YORK.

(Established Over 40 Years.)



Our Cars have all Late and Valuable Improvements. Are
noted for Light Running and Easy Riding. Combining
Lightness and Strength with Beauty in Design and Finish.
Our large Facilities Enable us to Fill Orders Quickly and at
the Lowest Prices for Superior Quality.

Manufacturers of Street Railway Cars.



Cliff's Graduated

STREET-CAR

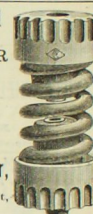
SPRING.

MANUFACTURED BY

Cliff & Righter,

No. 5 Day Street,

NEW YORK.

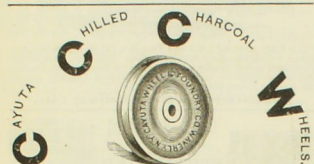


THE BALTIMORE CAR-WHEEL CO.,
 ESSEX AND BURKE STS., BALTIMORE, MD.

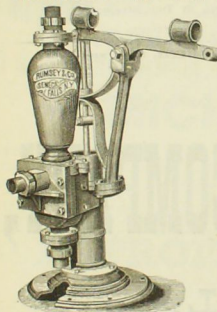
MANUFACTURERS OF
Chilled Wheels of all Patterns and Sizes,
 FOR EVERY SERVICE, AND WITH OR WITHOUT AXLES.
 W. S. G. BAKER, President. J. M. LAWFORD, Secretary and Treasurer.
 L. H. TAYLOR, Pres. J. H. WALKER, Sec. and Treas.
 S. P. RABER, Sup't.


TAYLOR IRON WORKS,
 High Bridge, N. J.,

MANUFACTURERS OF
 Chilled Iron Car-Wheels, Steel-Tired Wheels Car
 and Locomotive Axles and Draw Hooks.



MANUFACTURED BY
CAYUTA WHEEL AND FOUNDRY COMPANY,
 WAVERLY, N. Y.
 M. LYMAN, JR.,
 Superintendent and Treasurer

RUMSEY & CO. [Limited],


Seneca Falls,
 NEW YORK.

Manufacturers of
 OVER 800 DIFFERENT STYLES
 OF PUMPS.

More than 50
 Railway Companies have them
 in use.

ALSO
 FIRE ENGINES,
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ASK FOR
 RUMSEY'S
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and address for
 Catalogue and
 full information.

RUMSEY & CO.,
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HOWARD IRON WORKS,
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MANUFACTURERS OF
Schlenker's Automatic Revolving Die Bolt Cutter
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SPECIALLY ADAPTED FOR R.R. WORK.

H. L. LEACH

Agent for NASHUA IRON & STEEL CO.
LOCOMOTIVE TIRES,

Car Axles, Locomotive, Mill and Other Forging.
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TAPS, DIES AND GAUGES,
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THE PRATT & WHITNEY CO.,
 Hartford, Conn.

Illustrated Catalogues and Price Lists furnished on application.


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CAR WHEEL WORKS,
 CINCINNATI, O.

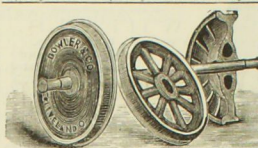
Manufacturers of CAR WHEELS of all descriptions,
 Wheels and Axles, Chilled Tires, Engine, Car and
 Bridge Castings, of any pattern, furnished to order at
 short notice. Wheels of all sizes constantly on hand.
 OFFICE: No. 274 W. Third St., Cincinnati, O.
 WORKS: Eastern Avenue and Lewis Street.
 L. A. GREEN, Sup't., Cincinnati, O.

DAVENPORT, FAIRBAIRN & CO.,
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MANUFACTURERS OF

CAR WHEELS,

Capacity 350 Wheels per day. Wheels made by improved process. Far more durable than those made in the ordinary way


CLEVELAND FOUNDRY.

Car Wheels of all Kinds and Sizes,
 WITH OR WITHOUT AXLES.
CHILLED-FACED RAILROAD FROGS.
 Street Railroad Turnouts.
 ROLLING MILL AND MACHINERY CASTINGS.
 Nos. 9, 11 and 13 Winter Street, Cleveland, Ohio.
BOWLER & CO.

Cleveland Wheel and Foundry Works,

MAHER & BRAYTON, Proprietors.

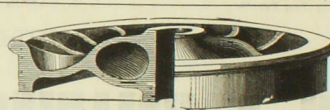
MANUFACTURERS OF

CAR, ENGINE, TRUCK AND TENDER WHEELS, RAIL-
 ROAD, ROLLING-MILL AND MACHINERY CASTINGS,
 AND STREET RAILROAD WHEELS AND TURNOUTS.

ALSO,

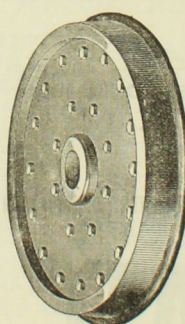
CHILLED-FACED RAILROAD FROGS.

Office: 20 Carter St. Works: Corner Carter and Collins Sts.
 CLEVELAND, O.


RAMAPO WHEEL AND FOUNDRY CO.,

MANUFACTURERS OF

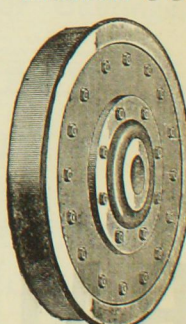
CHILLED WHEELS FOR DRAWING-ROOM AND SLEEPING COACHES,
LOCOMOTIVES, TENDERS, PASSENGER AND FREIGHT CARS.
 GEO. CHURCH, Pres't and Treasurer. W. W. SNOW, Sup't and Gen'l Manager.
 RAMAPO, ROCKLAND COUNTY, N. Y.

ALLEN PAPER CAR WHEEL CO.,


GENERAL OFFICES:
 240 BROADWAY, NEW YORK.



MANUFACTURERS OF ALLEN'S PATENT
 PAPER CAR WHEEL.
 ALL SIZES.



Especially adapted for Sleeping and Drawing-Room Cars, Locomotive and Tender Trucks. Steel Tire with Annular Web
 cast, Most Durable, and Most Economical Wheel in use. Works at Hudson, N. Y.; and at Pullman (near Chicago), Ill.
 A. G. DARWIN, President.

[August, 1881]

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EEL WORKS,
INNATI, O.
WHEELS of all descriptions
solid, Tires, Ropes, Car and
all sizes constantly on hand.
Third St., Cincinnati, O.
Lewy and Lewis Street
EX. 887, Cincinnati, O.

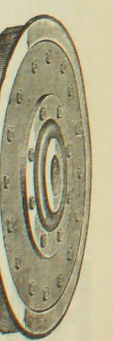
ELS,
FOUNDRY,
Kinds and Sizes,
UT AXLES
ROAD FROGS,
TURNOUTS,
CHINERY CASTINGS
West, Cleveland, Ohio
& CO.

ry Works,
N, Proprietors.
OF
DER WHEELS RAIL
CHINERY CASTINGS
S AND TURNOUTS.

ROAD FROGS.
Cartier and Collins Sts.
O.



DRY CO.,
COACHES,
EIGHT CARS,
and Gen'l Manager,
Y. N. Y.
EEL CO.,



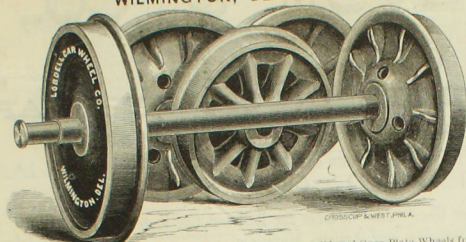
with American War
Chicago, Ill.

AUGUST, 1881.]

THE NATIONAL CAR-BUILDER.

vii

LOBDELL CAR WHEEL CO., W.D. WOOD & CO'S WILMINGTON, DELAWARE.



Single and Double Plate and Tires for Steam Roads. Also Solid and Open Plate Wheels for Street Roads.
Wheels with Turned Threads, under the Patent of "W. W. Lobdell."

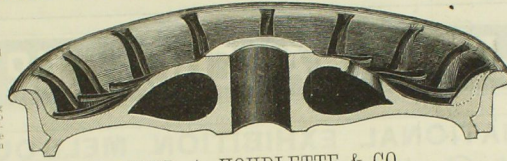
Geo. G. LOBDELL, President. W. W. LOBDELL, Secretary. P. N. BRENNAN, Treasurer.



**PATENT
PLANISHED SHEET IRON**
Patented March 14, 1865; April 8, 1873;
Sept. 8, 1875; Oct. 6, 1874; Jan. 11, 1876.
Guaranteed fully equal, in all respects, to the
IMPORTED RUSSIA IRON,
And at a much less price.
Locomotive Jacket Iron
Our Specialty.
For sale by all the principal Metal Dealers in the large
cities throughout the United States, and at their office.
111 Water Street, Pittsburgh, Pa.

ALLSTON CAR WHEEL COMPANY.

We would respectfully call the attention
of Railway Officials to the
"Washburn"
Pat. Homogeneous Metal-Tired
Car Wheels
Manufactured by this Company.



THE TIRES.—The material composing
the whole Tire of this wheel being two
inches thick on the tread—is OURS PATENT
ALTY, being a combination of metals, the
union of same never having before been
accomplished for same purpose.

OFFICE:
19 Battery March Street, Boston, Mass.

FRED. A. HOUDLETTE & CO.

CORDESMAN, EGAN & CO.,
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Most Improved and Patented WOOD-WORKING MACHINERY,
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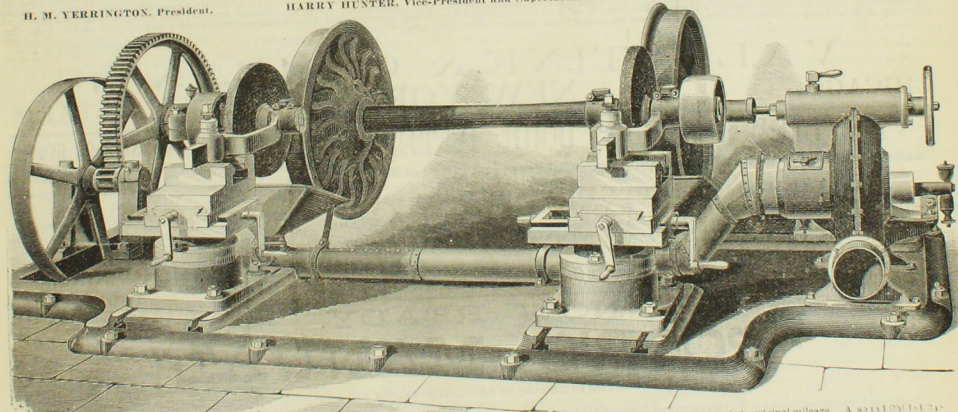
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Wheel trued by our method cannot be excelled by a paper or any other description of Car Wheel with steel tire. Allowing all new wheels to be 1/2 inch oval, if properly fitted to axle, our machine
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VARNISHES

JOHN BABCOCK & CO.

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LIBERTY SQUARE
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THE INTERNATIONAL EXHIBITION MELBOURNE, 1881.

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GENTLEMEN: By this we have the pleasure to inform you that your exhibit of Varnish has the honor to rank in the highest place in our International Exhibition, and stands alone for the first Order of Merit for Varnish by itself without any other goods to help it; and it is the only Varnish that has obtained First Order of Merit against all comers. We congratulate you upon the position you take, for the competition was great. Some of the English makers have magnificent shows, got up regardless of expense, and you may fancy we have been interested in the result, but were confident; and what makes it more valuable is the fact that it is the only First Order of Merit for Varnish alone, which was secured without your Varnish being exhibited in connection with other goods, to make the exhibit more attractive to the eye.

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VAN LIEW'S GRAIN DOOR PATENTS,

"Self-Operating," "Socket," "Circle and Lug," "Nail Proof" and "Bis'l & Mill'r Pat's."

VAN LIEW'S OUTSIDE CAR DOOR HANGER.

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The many thousands of Cars equipped during the past 5 years on roads such as C. & N. W.—P. F. W. & C.—Grand Trunk—Mo. Pac.—Penn. Co. & Lines—C. & A.—A. T. & S. Fe.—Wab., St. L. & P.—K. P.—all of Mr. Nettleton's K. C. roads—C., St. P., M. & O.—C., B. & O.—J., B. & W.—L., E. & W.—L., D. & S.—C. & F. I.—C., R. I. & P., &c.

P. S.—All work must be made from my standard patterns, which will be promptly and cheerfully furnished.

N. B.—All infringements in making or using either one or both of my radius bars, without my permission, will be held legally for damages—D. F. V. L.

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OF THE RAILROADS OF THE UNITED STATES FOR 1881.

Containing Detailed Statements of the Operations and Condition of every Railway Company in the Country. In one Volume, 1,300 Pages, Cloth, Royal Octavo. Price \$5 per copy. The "Manual" also contains a Directory giving the names and addresses of the Leading Manufacturers of Railway Material. Superintendents and Purchasing Agents will find this a very valuable work of reference when purchasing supplies.

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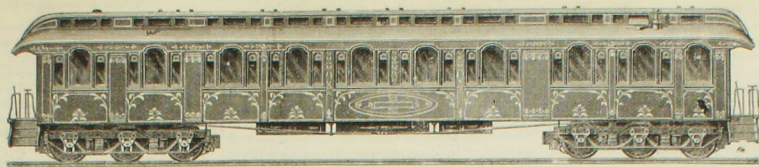
MOSES BIGELOW & CO.,

NEWARK, N. J.

RAILWAY VARNISHES

[August, 1881.

THE NATIONAL CAR-BUILDER.



DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XII.
NUMBER 8.

AUGUST, 1881.

(SINGLE NUMBERS, TEN CENTS.
\$1.00 PER ANNUM.

Miscellaneous Items.

THE Pullman Car Co., since they began to keep a record of axle service in 1874, have had no broken axles with paper wheels.

W. C. ALLISON & SONS, Philadelphia, are erecting extensive additions to their car works, having a frontage on Chestnut street of about one hundred feet, and extending back to their tube works on Walnut street.

THE Seymour & Sabin Mfg Co., makers of agricultural implements at Stillwater, Minn., have just commenced building cars, using convict labor for this branch of their business, under contract with the State government.

THE Griffin & Wells Foundry Co., Chicago, commenced business in April last with facilities for making 30 car wheels a day. The capacity of their works has been increased so that they expect very soon to make 200 wheels a day.

FOUR railway companies have combined to build a union depot in Cincinnati that will cost \$1,000,000, and be open to any and all railroads that choose to pay a pro rata rental. The new depot will occupy the square bounded by Third and Pearl streets, Central avenue and John street.

THE New York, Ontario & Western shops, at Middletown, N. Y., have just built 25 hay cars 33 feet long inside. They have suspension trucks and M. C. B. standard axles. The road is rebuilding its 55-foot coaches, cutting them down to 50 feet and substituting four-wheel for six wheel trucks.

A PATERNOS locomotive establishment has turned out for the Chesapeake & Ohio Railroad the largest locomotive ever made in that city, and said to be as large as any ever made in the world. It cost \$12,000. It weighs over 80 tons and has eight driving-wheels and a pony truck. The cylinder is 20 x 24-inch stroke, and the boiler is about six feet in diameter.

THE Schenectady Locomotive Works have orders in hand for 40 locomotives for the New York Central & Hudson River, and 30 for the Lake Shore & Michigan Southern roads. Since the completion of their new buildings, which have been in progress for the past year, the capacity of the works is equal to 14 locomotives a month.

THE New York & New England R. R. Co. is building at its shops at Norwood, 19 miles from Boston, ten new Eastlake passenger coaches. They are 54 ft. 4 in. long exclusive of platforms, and will seat 68 passengers each. The interior finish is in ash, mahogany and walnut, with elaborate moldings. The exterior is Pullman color, with gold ornamentation.

FRANCIS W. COREY & Co., of Chicago, are busy upon orders for hand-cars, and also for dump-cars. The latter are made of channel iron, and are of a special design. Those intended for the transportation of ore have three sets of springs which enables them to resist the falling of a ton weight from a height of six feet. The body, sides and floor are of wood.

A MAN in Philadelphia, over 70 years of age, sued one of the street car companies of that city for damage caused by injuries sustained by leaping from a car while it was in motion. He had requested the conductor to stop, but the request was not immediately complied with. The court which tried the case non-suited the plaintiff on the ground of contributory negligence in jumping from the car when there was no urgent necessity for doing so.

THE cars of the London Underground Railway comprise three classes, with accommodations and fares graduated accordingly. The number of third-class passengers greatly exceeds the first and second class combined. The line is emphatically the people's line, and its best patrons are the artisans and workers of the great metropolis. They are carried to and from their business in well-built, airy cars, that have clean woolen seats, wide windows and plenty of room. The regular third-class fares are two pence (four cents) and one penny (two cents) for workmen's trains at certain hours morning and evening.

A TEXAS railway track inspector, while officially traveling over the road in a stately palace car belted with several baskets of champagne, happening to look out of the rear window, was startled at the tapering appearance of the track, which seemed to narrow away as it receded in the distance. He immediately ordered the train to be stopped, got out, cut a stick, and after marking off the exact gauge, proceeded down the road for some distance, measuring the width of the gauge at various points. Presently he returned, saying it was all right, and that the track was of the same width all the way. The train then resumed its journey.

THE Pullman Car Co., in addition to orders noted in our last issue, is building at Detroit 2 sleepers for Utah Northern; 2 for Missouri Pacific; 2 for St. Louis & San Francisco; 7 passenger cars for Chicago, St. Paul, Minneapolis & Omaha, and a business car for E. Tenn., Va. & Georgia. At the Chicago shops, the new orders are for 12 passenger cars for the International & Great Northern; 12 for Union Pacific; 5 for Utah Northern; 100 flat cars for New York, Lake Erie & Western, and 50 for its own use. The company is also repairing and rebuilding 5 sleepers for the Pullman Pacific Co. and 20 of its own for various Eastern lines.

THE Lafayette (Ind.) Car Works are building 300 box cars for the International & Great Northern; 350 gondolas for the Atchison, Topeka & Santa Fe; 300 box and coal for Rochester & Pittsburgh; and 400 flat and 600 box cars for New York, Chicago & St. Louis. They now turn out 9 cars a day, which will be increased to 15 when some contemplated additions to the works are completed. They have built some six-ton hand cars designed specially for track-laying, having rollers at ends to facilitate handling of rails. The company employ nearly 500 men, make their own castings, build baggage, platform and warehouse trucks, and have designed a special iron frame truck for freight cars.

THE United States Rolling Stock Co. at Chicago employ about 450 men, and are building 8 or 10 cars a day. The orders in hand are for 80 box, 100 flat, 200 coal and 50 stock cars for Toledo, Delphos & Burlington; 500 box cars for Chicago, St. Paul, Minneapolis & Omaha; 700 box cars for Union Pacific; and 2 baggage and 1 combination car for Sioux City & Pacific. Among the novelties built this season were 2 flat cars 30 feet long for W. C. Comp's circus, and an advertising car for W. W. Cole's circus. The latter had two berth sections, an office and sitting room, the rest of the car being provided with sundry conveniences for the advance agent's use. The exterior was finely painted with representations of circus pageantry. Its cost was \$7,000.

MR. CHARLES SALKELD, foreman painter at the locomotive shops of the Lake Shore road, at Elkhart, Ind., uses a dryer that enables him to put on two coats of lead in a day. He can paint a tank and engine in two days, varnishing and lettering included; and the paint wears better than when put on in the ordinary way and many days given off for drying. In dry weather he can even put on a coat of white lead every hour, and have it a good wearing job when finished. He also uses a transparent filling for wood, which wears after being varnished as well as paint, with the additional advantage of showing the natural grain of the wood; and furthermore, he can by a peculiar preparation give to any varnish greater elasticity, and a gloss that will stand longer than that of ordinary varnish, and without cracking. His work is an actual demonstration of this.

A TRIAL was recently made on the Baltimore & Ohio road of a new freight train brake which Mr. Wm. Longbridge, of Baltimore, has for some time been engaged in perfecting. The object of the trial was to determine how soon a train consisting of an engine, tender, and three loaded freight cars, going at the rate of 25 miles an hour, could be stopped by the brake when applied to the engine, tender and cars, and also how soon the brakes could be released. The average stopping time in ten trials was 20 seconds. All the stoppages were made without sliding wheels. Upon increasing the power of the brake the engine wheels slipped on the track. The new invention dispenses with compressed air-pumps and gum hose connections between the cars. The brakes may be applied to the entire train without any connection or couplings, except those used to draw the trains. The report of the trials says nothing about the releasing of the brakes.

THE Pennsylvania Railroad has in use an automatic track tester which discovers faults in the track, not ordinarily appreciable to the eye, and makes a record of them which indicates their precise locality, and all this while the machine is passing over the road at from 15 to 25 miles an hour. It has the external appearance of a baggage car, but inside is fitted up with self-registering apparatus, electric clocks, etc. A bad joint

between the rails registers itself by the jolt it causes to the delicately hung car. Errors of level in the track are recorded by pencils on ruled paper, and so nicely arranged that variations of an eighth of an inch are made manifest. If the gauge is too narrow or the rails have spread, the fact is noted by another apparatus. An ingenious time and distance register enables the observer to locate the imperfections recorded. A machine of this kind kept constantly going over a railroad would be scarcely less careful than the track-walker in discovering sources of danger to travel.

THE WELLS & FRENCH CO., of Chicago, are building 40 caboose cars for the Atchison, Topoka & Santa Fe road. These cars have a clothes closet, saloon, wash-bowl and water tank. There are four berth-sections, with upper berths that swing up when not in use; two sections have cross seats and the other two long seats; raised floors for the clear-story, with two Baldwin chairs and an inside brake. They have Wythe speed recorders, Thielsen trucks, with French elliptic springs and channel iron spring planks. The floors are lined and deadened with shavings. The company are also building 4 two-masted derrick cars for the same road, and 3 single-masted ones for the Texas & Pacific. Besides 800 freight cars now in hand, they have taken contracts for 601 of different classes for the A., T. & S. Fe; 300 flats for Chicago, Milwaukee & St. Paul; 200 stock for C., B. & Q., and 275 flat, stock and box for Mexican Central. The company have just put in a new Corliss engine of 225 horse-power, made by E. P. Hallis & Co., of Milwaukee. This, with their new erecting shop, largely increases their capacity for building cars. About 1,000 men are now employed, and the works turn out from 20 to 25 cars a day.

THE Chicago & Northwestern Railway Co. have just built 5 pile-driving cars with which piles can be driven 16 feet forward of the wheels, and for a bent 18 feet wide. Under the end which carries the driver are two body-bolsters 6 feet apart, so the truck can be moved back when driving, and to the end bolster when running over the road. The frame, which has the driver at one end and engine house at the other, rotates on a center pivot so as to give the driver a swing of 9 feet each side from center of track. When the frame is thus rotated it is raised up with a 4-inch screw on the center pivot, when two men can move it to the desired position by the working of two gear-wheels running in a cogged track round the curved end of the car. It is then let down and rests solid on 14 small rollers that run on seven different tracks. The sides of the engine house are made with the upper half in doors hinged at the bottom to let down outward, which admits light and air and gives to the engineer a view of the driver and its machinery. The step-ladder to the top of leads of driver, serves as braces to hold the structure erect, and is arranged with a center joint to double up and let the leads down upon a rest which carries them when the driver with its 2,400-lb. hammer is not in use. Altogether it is a very ingenious and efficient arrangement, and reflects much credit upon its designer.

Locomotive Shops at Elkhart, Ind.

The shops of the Lake Shore & Michigan Southern road, at this place, may be classed among the best in the country. They are of brick, and are painted a light drab color. The principal one is 123x600 feet, and has a track running through the middle, upon one side of which are 25 pits, and on the other side lathes, planers, and a variety of other machinery. Connected with the main building are wings in which are the carpenter, boiler, blacksmith and tinsmith shops, also a grinding room and wash room. Adjacent are the foundry and rail shop, and two round-houses, containing

49 stalls. Near by is an oil room 25x90, with three separate compartments, one for packing and waste, another for storing oil, and another for its distribution.

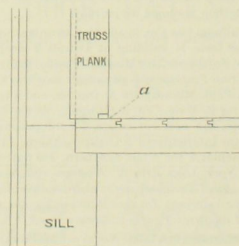
In the main shop is a drop-pit built in a table 50x10½ feet. The table is dropped and lifted five feet by six jack-screws worked by gearing connected with the main shaft, and is used for taking out and putting in wheels. A set of driving wheels can in this way be put in an engine in three-quarters of an hour, or less than one-third of the time required to do it by jack-screws worked by hand. Tires are heated in 20 or 30 minutes by Reed's gas heater, the burners of which can be adjusted to the different sizes of wheels. By this apparatus, tires are frequently taken off and new ones put on without removing the wheels from the engine. Cross-head pins are turned on a special lathe upon which a Giff revolving tool is used. A cross-head of any pattern can be clamped upon the bed, and the pin turned up in a few minutes.

For piecing out flues the Hartz & Fix machines are used, which, with their stationary mandrels, formers and rollers, perform the operations of cutting off, scarfing, spreading and welding, much quicker, cheaper and better than they can be done by hand. A set of 156 flues were in this way cut, fitted and welded in 19 hours, and at a cost for labor of only 2.43 cents per flue. These machines are made in Cleveland. In the grinding room emery wheels and stones are used for the finishing and polishing of rods, keys, nuts, valve-stems, guides, etc. By these and other labor-saving expedients a great saving is effected in time and the wear of tools and machinery.

All the shops are supplied with an abundance of running water from the water-works, which is utilized for conveniences not always found in railway shops. The wash room, for instance, has 60 bowls, with hot and cold water faucets to each, and under the skylight is a gallery for flower pots. Including engineers, firemen and foundry men, the master mechanic has 900 men on his pay roll. The work done is mainly the repairing and rebuilding incident to the care of over 200 locomotives used on the road west of Toledo.

Water-Tight Joint between Truss-Plank and Floor.

The cut illustrates a very effective plan devised by Mr. H. J. F. Small, foreman of the Wells & French Co.'s car shops, in Chicago, for preventing



water, when car floors are checked, from running under the truss-plank and checking the panels.

Under the edge of the plank is rabbeted out $\frac{3}{4}$ of an inch from the corner on the inside, and $\frac{1}{2}$ inch deep, as shown at *a*, and in the space is nailed flat-wise a piece of four-ply rubber packing $\frac{3}{4}$ of an inch wide. This is done before the plank is bolted down. The rubber, being thicker than the depth of groove, its elasticity makes a continuous water-tight joint, in spite of any shrinking of the parts.

Weight of Passenger Cars.

The cars whose weights are given below are a part of the equipment of the Boston & Albany road, and were built in the shops of that company under the supervision of the General Master Car-Builder. They all run upon steel wheels, those of 33-inch being on the average about 12½ lbs. per wheel heavier than iron wheels of the same size. The 42-inch wheels weigh about 1,000 lbs. each.

WEIGHTS.

One sleeping, car 61 feet long, with 6-wheel trucks, and 42-inch wheels:	
Weight of car body.....	38,040
do. do. trucks.....	28,950
	66,990 lbs.
One drawing-room car, 61 feet long, with 6-wheel trucks and 42-inch wheels:	
Weight of car body.....	35,239
do. do. trucks.....	28,720
	63,959 lbs.
One drawing-room car, 61 feet long, with 33-inch wheels, and 6-wheel trucks:	
Weight of car body.....	41,590
do. do. trucks.....	27,260
	68,850 lbs.
One Wagner sleeper, 33-inch wheels and 6-wheel trucks; length not stated:	
Weight of car body.....	44,900
do. do. trucks.....	21,000
	65,900 lbs.
One passenger coach, 55 feet long, 42-inch wheels and 4-wheel trucks:	
Weight of car body.....	27,660
do. do. trucks.....	18,150
	45,810 lbs.
One passenger coach, 55 ft. long, 42 in. wheels and 4-wheel trucks:	
Weight of car-body.....	27,640
do. do. trucks.....	18,140
	45,780 lbs.
One passenger coach, 55 feet long, 42-in. wheels and 4-wheel trucks:	
Weight of car-body.....	27,880
do. do. trucks.....	18,140
	46,020 lbs.

Then follows a list of 27 coaches, each 55 ft. long, with 4-wheel trucks and 33-inch wheels. To avoid unnecessary detail, we give the average weights of these, with greatest and least weights of bodies and trucks respectively, as follows:

Average weight of bodies.....	28,670
do. do. trucks.....	15,150
	43,821 lbs.
Greatest weight of bodies.....	36,650 "
Least do. do. do.....	21,460 "
Greatest weight of trucks.....	16,120 "
Least do. do. do.....	12,440 "

The passenger equipment of this road, including coaches, sleepers and drawing-room cars, probably comes nearer to a minimum of dead weight than that of any other road, due allowance being made of course for the extra weight of the more expensive and durable steel wheels, and also for the extra length of its standard coaches as compared with those of most other roads. In the current descriptions of this class of rolling stock, weight is not usually stated, either because it is not ascertained, or because it is too great to bear the test of scrutiny. We shall be glad to receive statements of the weight of passenger cars from other sources, so as to be able to make comparisons. In passenger as well as in freight traffic, weight is what costs, whether it is in a brake-shoe or a Saratoga trunk.

The Ohio Falls Car Co., at Jeffersonville, Ind., has a large amount of work on hand, having contracts to fill for about 100 passenger cars and a large number of freight cars.

The Gilbert Car Works, in Buffalo, N. Y., have lately closed contracts for 200 box cars for the New York, Ontario & Western, and 300 for the Northern Pacific. The works are running full and turning out six or seven cars a day.

STEEL AND IRON IN CAR CONSTRUCTION.

the corresponding \mathcal{H}_2 norm of the closed-loop system $\mathcal{H}_2(\mathcal{G}_\gamma)$, we have

The committee on this subject made a report, referring to the circulars issued by them and the previous recommendation by the C-r-Builders' Association that brake-shafts should always be placed on what is the left-hand corner next to the brake-shaft on the opposite side. The replies to these circulars indicate that but a very small portion of the great aggregate of freight cars have brake-shafts on the wrong side, and that these are being corrected. The committee on this subject has been asked by the committee also report in reference to the best position for freight car ladders, that 43 roads considered the left-hand corner next to brake-shaft as the best position; 29 roads considered the right-hand corner opposite brake-shaft as the best; 3 roads that ladders should be placed both on side and end of cars; a few roads say anywhere from end to end of car. The committee has decided to recommend that it is safer for train-men, as they are out of the way

Mr. ADAMS said that putting the dog on top of the car did not lessen the danger so much as was supposed. When the brakeman applied the brake he did not stand up straight by any means, but threw himself round entirely out of balance, holding on by the wheel, and if the wheel gives way he is likely to go off the car. With the brake-staffs ordinarily used he has to bend over, or else the wheel must be higher, and it must not be more than 13 feet from the rail, or there was

difficulty in running into elevators. As for the simplicity of the thing, there was certainly nothing more simple than the lever arrangement to which he had referred, and with which a man could apply three brakes while he was applying one with the wheel.

Mr. KIRBY said that in 1878 he had got up the plan to which Mr. Adams had referred, setting the brake-staff back about two feet more or less from the end of the car, the connection with the brake being part chain and part rod. The staff was about two feet high, which in practice proved too short, and it had to be discarded by running the shaft up higher, and placing the ratchet and pawl on top of the car. The long staff was much more effective than the short one.

Mr. C. E. GAREY had made some experiments a few years ago to determine the power of a long staff as compared with that of a short one—about four feet long—worked from the platform, and he found that by using a spring that would give the amount of power put on the brake beam he could get about a third more power with the short staff than with a long one.

Mr. VERBRYCK had tried a lever plan which was got up in his shops, and found great difficulty with it on account of the slack caused by the wearing away of the shoes, unless it was very nicely adjusted all the time.

Mr. ADAMS said there was no device absolutely perfect. All that could be aimed at was to get the best that was attainable. As regards the slack from the wear of shoes, it could be taken up much quicker and with less trouble with the lever arrangement than with the old-fashioned wheel brake, by means of links in the chain, dropping one link and hooking on to the next one at the extent of the slack may require.

Mr. MARDEN called attention to the fact that on some cars the brakeman's step was left off altogether, and that such cases being exceptional, accidents might be caused thereby, especially in the night.

Mr. ADAMS said that as he understood it, the various devices brought to the attention of the convention, including those pertaining to brake appliances, were to be discussed upon their merits and without any reference to patents. This was the basis and rule of all our action; and if so, why was it not proper for the convention to approve of devices that were worthy of approval and against which no one raised any objection, and to call the attention of railway companies to them? He would therefore move that the convention cordially approve of "Johnson's Brake" and recommend the same to railroad companies.

Mr. DAVENPORT wanted to know how much the patent fee was going to be. He was opposed to recommending anything without knowing just what it would cost.

Mr. BISSELL thought this matter of royalties was quite out of our sphere. The question was simply on the merits of the device. We could not compel any railroad company to use it, and in recommending it we were not voting away anybody's money any more than if we were recommending a particular brand of tea without saying what it was to cost. This brake question involved the saving of human life.

Mr. COULTER was opposed to adopting anything as a standard without knowing what it was going to cost. This would be the first question he would be asked by his superintendent when he got home.

Mr. MARDEN suggested that the matter had better be referred to a committee, and that they report at the next meeting.

Mr. ORTTON thought the more proper way would be to note in the minutes of the proceedings that a certain device had been mentioned and favorably regarded. He was not quite ready to adopt it as a patented article.

Mr. ADAMS explained that he did not propose that the convention should adopt the invention, but merely that a resolution of approval be passed, and that the attention of railroad companies be called to it. The cost could be ascertained by application to the proprietors, and as they were in this case very modest men, he did not think the royalties would be very excessive.

Mr. DAVENPORT referred to a discussion which took place at the meeting of the Association in Chicago in 1879, upon a question of this kind, when the members worked themselves into a white heat of excitement; and in order to avoid any such scene on the present occasion, he would move that no mention of patented inventions be made by this Association, unless in such mention the amount of royalty be distinctly and officially set forth, and that this be a standing rule.

The motion was seconded, but ruled out of order by the Chair.

The President thought the convention should be careful in recommending anything that would give the lawyers a chance to say in the courts, in suits against railroads for damages, that if any particular device which the Association had recommended had been in use no damage would have occurred. Nothing should be placed on record that by legal construction could be made to reflect on the competency of the Association in deciding upon the merits of inventions that are brought to their attention.

Mr. BISSELL remembered the "white heat" at Chicago in 1879, but this year it was almost all gone. We had got so far along now that we could recommend to the roads meritorious devices, whether they were patented or not; and in view of the legal responsibility which might be incurred thereby, he claimed we ought to do this very thing. We were, from our positions, experts as to the merits of this class of devices, and the courts would decide according to our evidence—that is, in favor of the company that used the most approved means, or the best they knew of at the time, for the prevention of accidents. If this Johnson brake appliance was a good and meritorious life-saving device, he thought the convention ought to recommend it, and that they could not recommend it too strongly, no matter what it costs.

Mr. HILDRUP was of the opinion that improvements of this kind should be recommended as they came along, regardless of price. We could not control the price, nor could we ignore the subject entirely. He would therefore offer the following resolution as a substitute for the motion of Mr. Adams:

Resolved, That we recognize valuable features in Mr. Johnson's lever brake in the direction of perfecting hand-brakes for railroad cars.

Mr. ADAMS accepted the substitute. He would say a word about exposing the companies to legal consequences by the acts of the Association. We had talked a good deal about being cautious, so much, indeed, that we were afraid to recommend anything except some old device, perhaps, that had gone out of date, or the patent upon which had expired. When the lawyers get a knowledge of this state of things, they will be likely to blame the companies for not employing more competent men, while still holding them to the same responsibility. Suppose he (Mr. Adams) should be put on the stand in the case of a man falling off a car by the giving way of a brake-wheel on his road. He would have to admit a knowledge of the breaking of the wheel, and would not that implicate the company just the same as if this Association had recommended a safety-appliance which the road had neglected to use.

Mr. SMITH contended that the convention in its action had nothing to do with patents. If a patented device was good it would work its way into use, no matter whether we recommend it or not; and as for the price, that must be arranged by the parties the same as the price of anything else.

Mr. BISSELL—We have got to ignore improvements or recommend them—one thing or the other. We must climb or get down. What, he would ask, are we here for? If a good thing is brought before us, ought we not to have independence enough to say so? And if we do and can say so, it is an evidence that the Association is gaining ground and that the world moves.

Mr. SMITH thought that a committee might properly report upon the merits of a patent, but not the Association, as such.

The pending resolution and the whole subject was then referred to the Committee, which was continued another year.

STANDARD WHEEL GAUGE.

The committee on this subject made no report, and was continued.

Mr. ADAMS, pending a motion to continue the committee, wished it to be understood that the convention had decided that committees could with propriety consider the merits of patented devices; and he thought it would be well for the Secretary of the Association to inform members of committees of such decision.

The President called attention to the construction of draw-bars in regard to the space allowed for links. Mr. Hoyt, at West Albany, had collected from the cars of different roads, 353 links, the lengths of which varied from 12 to 16 inches, and the spaces allowed for the links to move back from the face-head of draw-bar, varied from 5 to 8 inches. There was also a variation of from 2½ to 4 inches from face of bar to center of pin hole. He was of the opinion that many accidents were caused by lack of space in the draw-bars sufficient

to give the links free motion, so as to prevent them from being crushed by the buffing, before the force of the impact could be received on the draw-head.

Mr. KIRBY thought the danger of the pins breaking by the pulling strain was very much greater than the breaking of the links by buffing. Most of the cast-iron draw-bars gave a play of 1½ inches of the link on the pin, while in some others it was as much as 4 inches.

Mr. L. GAREY read some figures showing that the openings for the links in cast-iron draw-bars varied very greatly, the larger proportion being over 3 by 6 inches. He had not found a wrought-iron bar that had not room enough for the link.

Considerable conversation followed on the necessity of having links of a standard size, the preference being in favor of 10 inches inside length. The idea was expressed, however, that it was hardly worth while to make much effort to obtain a standard link, in view of the probability that links and pins would soon be superseded altogether by some kind of automatic coupling.

CONING OF WHEELS.

Mr. L. GAREY spoke of the tendency to come the tread of wheels more than has been the practice heretofore, and especially steel tired wheels. He had been informed by those whose business it was to know the condition of railway tracks that the sliding of wheels on curves was on the outer rail, the opposite wheels being forced on to the inner rail up to their flanges, and causing them to run on their largest circumference, while the outer ones run on their smallest circumference, and at the same time the most weight being thrown on the inner rail, relieves the outer wheel and causes them to slip. If this was so, the coning of a wheel adds to its size just where the increased size is not wanted, and diminishes its size just where it ought not to be diminished.

Mr. ADAMS doubted the theory that the inside wheels as a rule pressed their flanges in curving against the inside rail. Much would depend on the momentum of the train. If the train was going rapidly it would naturally follow the outer rail. He believed that this was the case with all trains moving as slowly as 15 miles an hour even.

Mr. GRIFFITH said that on short curves, especially, the outside rails had to be renewed often because the inside ones, which showed that the pressure and wear upon them was the greatest.

Mr. L. GAREY asked how it was that the wheel slid on the outside rail when the friction surface was the largest. Also, how it was that the outer rail was pushed forward while the inner one remained stationary.

Mr. HILDRUP said it had always been supposed that coned wheels would more readily get around curves, for the reason that the outer rail, being the longest, the wheel went to that side, and that running there on its largest diameter, and on its smallest on the inner rail, it got around easier. He had never before heard the correctness of this theory questioned. It was just as easy to make flat treads as coned ones, but he had never found a wheel-maker or railroad man who would advocate an entirely flat tread. About 3-16 of an inch was the prevailing idea as to the amount of coning that was desirable to curve easily, and avoid the peculiar snake motion imparted to trains by short curves after getting on the straight track. He believed that in curving, the outer wheels slipped forward and the inner ones back, more or less.

Mr. ORTTON said that in locomotive service it was well known that if wheels were not coned there was always danger of mounting the outer rails. The drivers on the road he represented were always suspicious of a wheel that was badly worn. It was required by a natural law that in order to get round a curve the wheels must either have different diameters, or some equivalent thereof must be provided, and this was the cone, and the more there was of it the less friction there was on the outer rail.

FREIGHT TRAIN BRAKES.

The discussion of this subject was resumed. Mr. C. E. GAREY explained the object of the committee in recommending the fitting up of 50 cars for the purpose of testing the various devices that had been brought to the attention of the committee. There were probably a dozen of them, and it was deemed expedient that such of them as had been tested in a small way should be tested more thoroughly, to see if they would meet all the conditions of practical service.

Mr. VERBRYCK said that the Chicago & Rock Island road had 16 cars equipped with what is called the Thompson brake, but the cars were scattered, and he had been unable to get them to-

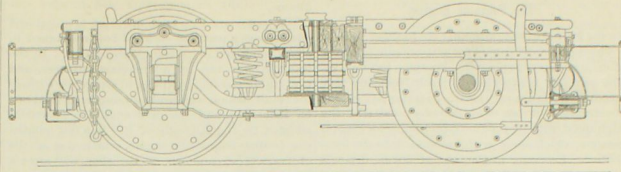
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AUGUST, 1881.

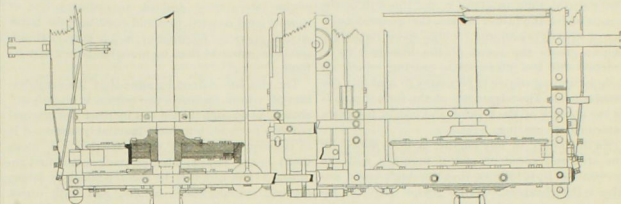
THE NATIONAL CAR-BUILDER.

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STANDARD PASSENGER CAR TRUCK-ATCHISON, TOPEKA & SANTA FE RAILROAD.



Side Elevation and Section.

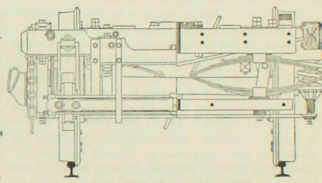


Inverted Plan.

Top Plan.

DIMENSIONS, ETC.

Length of frame	11 ft. 6 in.
Width of frame	6 " 6 1/2 "
Side timbers	7 1/2 " x 7 in x 11 " 9 "
End	4 " x 9 " x 7 " 1 "
Cross	4 1/2 " x 9 " x 6 " 9 1/2 "
Safety beams	2 1/2 " x 9 1/2 " x 5 " 1 1/2 "
Spring plank	3 " x 18 " x 5 " 5 1/2 "
Boiler, 6 1/2 " x 15 1/2 in. to be constructed in three parts with two 1/2 " x 6 1/2 in. iron plates between parts.	
Allen pair wheels, 42-inch hammered axes.	
M. C. B. standard wheel base	7 ft. 0 in.



End Elevation and Section.

gether so as to arrive at any definite result as to the capacity of the brake. The device was a new one, and the officers of the road were much interested in it.

After considerable discussion, in which several members took part, as to the best method of securing the attention and co-operation of railway managers in testing the several train-brake devices on their respective roads, it was decided that the recommendation contained in the committee's report was all that was necessary for that purpose. The report as presented was then agreed to.

The Committee on Correspondence made a report recommending that the thanks of the convention be tendered to Messrs. F. W. Devoe & Co., of New York, for their invitation to witness the exhibition of "Luminous Paint" at their establishment.

On motion, the election of officers of the Association was postponed for one year.

PRESIDENT GARREY then addressed the convention as follows: Gentlemen—While thanking you for the confidence you place in me as your presiding officer, I must assure you that the position is one that involves a great deal of labor, and while I have at heart the welfare of the Association, I would very much prefer, and now suggest, that at our next meeting a change of officers be made, so far, at least, as your President is concerned. The convention then adjourned to meet in Philadelphia on the second Tuesday in June, 1882.

A New Palace Car.

The Chicago, Burlington & Quincy Railroad Co. have recently built at their shops, at Aurora, Ill., a new state room car to run between Chicago and Council Bluffs. It is said to have cost \$35,000, and to surpass in beauty of design and construction any car of its class that has been built at the West. It contains five state rooms richly and handsomely furnished in every respect, and containing every contrivance for convenience and comfort that ingenuity can invent. The inside finish is of light mahogany, and the paneling is of oak artistically carved with various devices. The newest feature in the construction of these rooms is, that half way from the floor they are divided from each other and the body of the car by open wicker work, which gives them an airiness and cheerful appearance wholly wanting in the ordinary state room car. On both sides of the wicker work are raw silk curtains, so that should occupants desire privacy they have only to draw these down to secure it. The seats are upholstered with rich scarlet velvet, and in addition to the ordinary sofas, each state room is supplied with folding seats, which, when not in use, take up no room in the apartment. The toilet arrangements are simply perfect, each state room being furnished with every requisite. One end of the car contains a commodious lady's dressing room, there being one at the other extreme for the sterner sex. Besides the state rooms, the car has eight double and eight single berths, the upper of these being separated from the under by the curtain being looped to the outer rails of the former. One of the most valuable features is the double state room, for the use of invalids, which has water closets attached, and every comfort calculated to make the journey of the suffering ones as endurable as possible. There are also four store-rooms and a sleeping place for the porter. The ventilation of the car is unsurpassed, double windows having been put in, and to the outer one is attached a very fine wire screen, which prevents the dust from entering when the window is raised. This also prevents an outsider from reaching in and stealing portable articles. Outside the window is a movable wing or shield that throws off the cinders, and prevents them from entering the car when the window is open. The car will be heated in winter by hot water pipes, the heating apparatus being placed at one end. There are ample accommodations for forty passengers, the scale of prices being the same as on a Pullman. The state room feature will be rec-

ognized as just the thing for parties, or families and ladies traveling alone. Within easy reach of the passenger is an electric button that one simply presses to order refreshments from the dining car, or summon the attendance of the porter. Such in brief form is a description of the car. Two more of the same design are now in process of construction.

THE Rock Island & Pacific Co. is building at its Chicago shops six second-class passenger cars 48 feet long. The inside finish is plain ash, the seats are upholstered in plush, and the cars will be quite as comfortable for riding as ordinary coaches.

THE Jackson & Sharp Co., at Wilmington, Del., is building 15 passenger cars for the Western Maryland, six for the Texas & Pacific, and eight for the Northern Pacific. Six Woodruff parlor cars are being built for the Long Island road; and two excursion or hunting cars for the Worcester (Mass.) Excursion Company.

MR. JAY GOULD travels in a car fitted up specially for his use. It is called the "Convoy," and is as large as a Pullman sleeper. The front end contains the kitchen, the cooking apparatus and sideboards, where all the cuisine is prepared by an imported cook, who is a French mulatto. The middle portion of the car is devoted to an interchangeable drawing-room, sleeping-berths and dining-room, capable of accommodating about twelve persons. The rear end is in the nature of a private office, on

two sides of which are magnificent divans, and on the right-hand side a large, square table, securely placed and covered with stationery, stamps and telegraph blanks. The movable furniture of the car is unstained white wood, elegantly upholstered with velvet and plush. The tapestry and hangings are all of green, to match.

R. M. REEBTOM, an English engineer, gives the following flattering opinion concerning American locomotives: "I argue that the greater duty done by the American motor is due to the better design and better system of working the locomotives. The American builder excels in the system of framing and counterbalancing, and in designs of crank axes, etc., so that the engine may run remarkably easy and without jar round sharp curves, and work not only on the light roads, but also diminish the wear and tear on the solid roads, and at the same time increase the effective tractive force. The English engine is a very heavy affair, and in running it not only wears and tears itself very rapidly, but also the roadway, and by its unsteadiness and jar it greatly fatigues the drivers and firemen. I have ridden hundreds of miles on engines in India, in France and in the United States, and have always found the American engine most easy and comfortable; but I never did the English or the Continental engines. It is almost impossible to give these engines their full hauling power, simply because the greater portion of the weight cannot be thrown on the driving wheels."

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Communications.

The Fontaine Engine.

To the Editor of the National Car-BUILDER :

The mechanical papers for some reason fight shy of criticisms concerning the Fontaine locomotive. The gain that is expected to result from the new construction is not very clear. In stationary engine construction, it has been demonstrated that the high speed (rotative) engine is preferable for general reasons, which apply with equal force to the locomotive. Economy in the use of steam depends almost entirely on the condensation of it while in the cylinder, and evidently, when the point of cut-off is properly adjusted, there will be the least condensation in the cylinder with which the steam is the shortest time in contact, and this will be the one in which the piston makes the greatest number of strokes per minute. A high speed stationary engine allows the speed of the line-shaft to be reached with less intermediate gearing, which, on a slow-running engine is necessary to multiply the revolutions. The advantage of the former plan is in the absence of the friction and cost of the extra intermediate gearing.

As the power of any engine is determined by the area and speed of piston, together with the pressure on it, it follows that the high speed engine is the cheapest, for the reason that the increased speed permits the requisite power to be developed with a less area of piston—proportionally less as the piston speed is higher—and less area of piston means a smaller cylinder and engine, and therefore a cheaper engine to build.

These points apply equally to the locomotive and stationary engine. The effect of the top pair of wheels in the Fontaine engine is to reduce the piston speed for a given speed on the rails as compared with an ordinary engine. As this reduction means a reduction of power, it is necessary to enlarge the piston area to make up for the deficiency in piston speed. This enlargement means a larger cylinder and boiler to make as powerful an engine as would result by connecting directly with the driving wheels in the usual way with smaller cylinders, the driving wheels—those touching the rails—being the same in both cases. The loss from condensation would, of course, be less in the ordinary engine, as the cylinders are smaller and the piston speed higher, thus presenting less surface and less time of contact for condensation to take place. The ordinary engine will also have less friction to contend with, inasmuch as the intermediate wheels can be dispensed with, as well as the expense of keeping them in repair.

There is nothing novel in driving the lower wheels by frictional contact, as the system has been adopted in mill work, and is identical in its action with the ordinary driving wheels, which advance by frictional contact with the rails.

The only effect of the Fontaine style of engine is to reduce the piston speed; and as high piston speed is no detriment, but on the contrary a benefit, the advantage of the reduction is not clear. The maximum piston speed has not been reached, and much higher is attainable if larger passages are used to decrease wire-drawing to a minimum. But as to the "proof of the pudding," it must be admitted that the Fontaine has made a very fair record, but not better in any way than ordinary engines have made. It must be borne in mind that in the trials of this engine everything is in the most favorable condition to secure good results. The comparisons between the Fontaine and the ordinary engine have been made with the former at her best, and the latter at average condition. In a recently published trial trip in which the Fontaine made a trifle better time than its competitor had made on a previous run, it had

everything in its favor, while the run of the ordinary engine was made under merely average conditions.

The writer recalls a trial made of a prominent engine with a peculiar style of boiler designed to effect economy in consumption of fuel. In the test, she was run by a first-class engineer, and everything possible was done to secure the wished-for result, which was really an unprecedented one on that road, and the new engine was partially adopted on the strength of it. In a few months the testing engineer's engine, which was of the ordinary type, came out of the shop, and after a few breaking-in trips, and while she was in the best possible condition, a trial with her was made, the result being very much better than what was obtained with the former engine. If the Fontaine engine were tried against an ordinary one of equally good construction and condition, the latter would prove to be superior, and it may, I think, safely be assumed that no more Fontaines will be built.

The idea entertained by some that the combination of wheels increases the power, is manifestly absurd, as no such device can increase the original power a particle, but must inevitably decrease it in consequence of the extra friction. If more speed is the object, a better track is the first requisite. The rest will be accomplished by larger drivers, cylinders and boilers, and with direct coupling with drivers—a plan which I feel confident will never be superseded.

In connection with what has been said above, it may not be out of place to refer to another peculiarity of locomotive construction to which public attention has of late been directed—a four-cylinder engine—designed to obviate the imaginary evil of a lack of proper counterbalancing at high speeds. Engines can be successfully counterbalanced for average speeds so as to run quietly, the variations of speed assuming no importance, and the wear and tear, at the most, being a much smaller item of expense than the interest on the extra money invested in the four cylinders and in keeping the extra gearing in order. If the inventor of this latter device would achieve a lasting success, he can do so by changing his four-cylinder into a compound engine—a change that would give assurance of satisfactory and important results.

FRANK C. SMITH, M. C.

Wheel Service—Four and Six-Wheel Trucks.

To the Editor of the National Car-BUILDER :

I notice in your July number a communication giving some statistics showing the comparative service of wheels in four and six-wheel trucks. According to the figures, the mileage is largely in favor of the six-wheel trucks. The cost, however, would seem to be about 5.8 per cent. in favor of the four-wheel trucks, as is shown by the following demonstration, based on the assumption that the value of the service must be measured by the car mileage:

If the 12 cars (6 of them having 12 and 6 of them 8 wheels each, as stated) had all been equipped with six-wheel trucks, and had the wheels been worn out at the average mileage of 63,173 miles, as stated, each car would have run with one set of wheels 63,173 miles, and the 12 cars would have made a total mileage of 758,076 miles. The 144 wheels under the 12 cars, at the estimated cost of \$12.50 each, would have amounted to \$1,800, being an average of \$2.37 for each 1,000 car miles. But if, on the other hand, the 12 cars had been equipped with four-wheel trucks, and had made the same total mileage of 758,076, the total wheel mileage would have been 6,064,608. This, with the average mileage, as stated, of 44,556, would require 136 wheels, which, at the above estimated cost, would be \$1,700, or

\$2.24 for each 1,000 car miles, or a saving of 13 cents as compared with the six-wheel trucks.

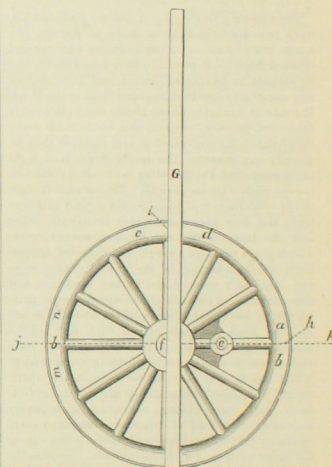
It is generally thought that four-wheel trucks usually make a better comparative mileage than that reported by your correspondent. At some future time I hope to be able to give you some more satisfactory data on this subject. It is the great weight of car and load that makes six-wheel trucks desirable, and this from considerations of safety rather than economy. KANKAKEE.

The Quartering of Driving-Wheels.

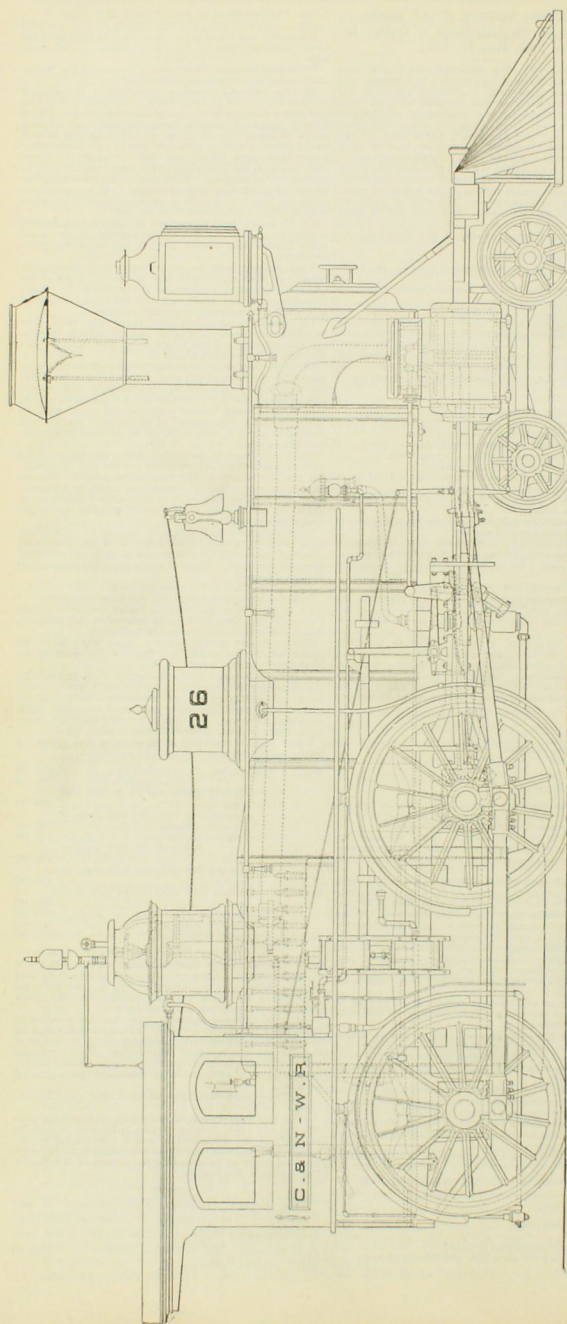
To the Editor of the National Car-BUILDER :

The old-fashioned mode of quartering driving-wheels was with the level and plumb-line. This method is still in use in many localities; and with good tools and great care, satisfactory results are obtained. But the reversing of the level for corrections, and other features incident to this plan, make it not altogether desirable. Quartering devices attached to wheel lathes are very handy, but they are not found in all shops. The following plan, as shown in the accompanying cut, will be found to give entire satisfaction, and to be superior to the line and level.

Centers are placed in the pin hubs and one is marked. A line *jk* is drawn through the center of wheel *f* and the marked center *e* by means of a



straight-edge, and a mark made on the side of the tire at *h* where the straight-edge cuts it. With a pair of trams, the short arcs *a b*, *c d* and *u n*, are drawn on the side of the tire as shown, and a point *i* is found on the top arc equally distant from *f* and *h*. A straight-edge of known truth is clamped to the wheel, its edge cutting the center of the wheel and the mark *i*. A similar straight-edge is clamped to the other wheel and adjusted till its edge is out of wind and perfectly parallel with *G*. This is ascertained by sighting over their edges. Where the second straight edge cuts the pin-hole on its side, is the center of it, arcs being struck on with pin-holes equal to the length of the crank from the center. This plan gives very correct results, inasmuch as the straight-edges are from 12 to 15 feet long, and an error at the pin-hole will be multiplied at the out end of the straight-edge as often as the length of the crank is contained in the length of straight-edge. This magnifying of errors makes them very perceptible at the out end of the straight-



STANDARD PASSENGER LOCOMOTIVE—CHICAGO & NORTHWESTERN RAILWAY.

Designed by Geo. W. Tilton, Supt. of Machinery.

The engravings illustrate in section the standard passenger locomotive of the Chicago and Northwestern Railway Company, designed and recently built by Mr. Geo. W. Tilton, Superintendent of machinery at their West Chicago shops. It burns soft coal. Its principal dimensions are as follows:

From center of main driving axle—
 To center of tumbling shaft..... 3 ft. 9 in.
 To center of rocker-box..... 5 " 4 1/2 "
 To center of cylinder and saddle..... 11 " 10 3/4 "
 To face of 10 " 6 1/2 "
 To inside yoke..... 6 " 1 1/2 "
 Length from fire-box to front end of smoke box..... 14 " 4 1/2 "
 Square feet of grate surface..... 16
 Square feet of heating surface of fire-box..... 107
 Square feet of heating surface of flues..... 993
 Total square feet of heating surface..... 1,100
 Driving wheel base..... 8 ft. 4 in.

Truck wheel base..... 5 " 6 "
 Wheel base of locomotive..... 28 " 0 "
 Wheel base of engine and tender..... 40 " 1 "
 Weight on driving wheels..... 31,000 lbs.
 Weight on engine and tender..... 30,000 "
 Total weight of engine in working order..... 9,880 gals.
 Capacity of tank..... 48,000 lbs.

CONSTRUCTION.

Abutment.—To be made of 3/4 in. sheet iron, with angle iron corners and stiffening pieces, to be 12 in. deep, and to be secured to the fire-box by three 3/4-in. studs on each side of the cylinder, and to the tender by two 3/4-in. studs on each side of the boiler.

Back damper are to be operated from the foot-board of the cab in the usual way.

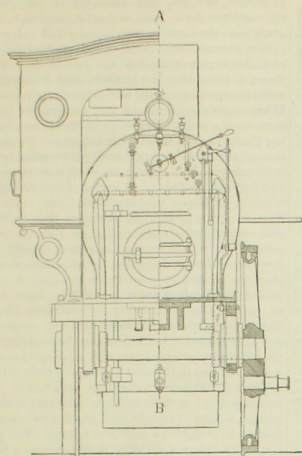
Boiler.—To be made throughout of the best quality of homogeneous open-hearth steel, 3/4 in. thick, and riveted to side over the fire-box, as the form of the wagon-top is a continuous circle over the top and around the sides with proper connection and cock on boiler. Heater

For dimensions of the different parts, see *Fire-Box*, *Boiler Shell*, *Stay-Bolts* and *Crown Bars*.

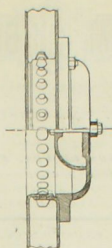
Boiler Trussings.—Front end and door of cast iron, of a suitable pattern, with a number-plate of 17 in. outside diameter, fastened with 8 studs on the door, containing the painted number of the engine; cast-iron trusses and bolts, 11 in.; length out of fire-box 6 ft. 1 1/2 in.; length out of fire-box and boiler, 11 ft. 6 1/2 in.; length of smoke-arch, 2 ft. 6 in.; side diameter of barrel, 50 in.; wagon-top to be raised 5 in. above sheet of barrel next adjoining. Total height of back head, 7 ft. 2 in. Dome on wagon-top of 36 in. outside diameter, and 28 in. high above shell of boiler; center of dome to be 3 ft. 3 in. from face of back head. Greatest width of boiler, measured over wagon-top, 4 ft. All horizontal seams in boiler and junction of weight and fire-box are to be double riveted, and all parts thoroughly stayed. There are to be no braces from side to side over the fire-box, as the form of the wagon-top is a continuous circle over the top and around the sides with proper connection and cock on boiler. Heater

to the point where it meets the legs of the fire-box, as shown in the drawings, fig. 2.—See *Boiler*.

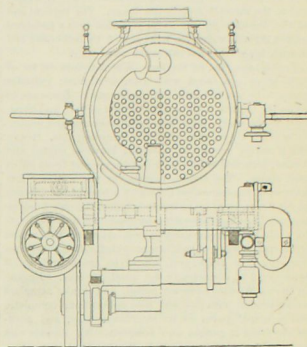
Boiler Trussings.—Front end and door of cast iron, of a suitable pattern, with a number-plate of 17 in. outside diameter, fastened with 8 studs on the door, containing the painted number of the engine; cast-iron trusses and bolts, 11 in.; length out of fire-box 6 ft. 1 1/2 in.; length out of fire-box and boiler, 11 ft. 6 1/2 in.; length of smoke-arch, 2 ft. 6 in.; side diameter of barrel, 50 in.; wagon-top to be raised 5 in. above sheet of barrel next adjoining. Total height of back head, 7 ft. 2 in. Dome on wagon-top of 36 in. outside diameter, and 28 in. high above shell of boiler; center of dome to be 3 ft. 3 in. from face of back head. Greatest width of boiler, measured over wagon-top, 4 ft. All horizontal seams in boiler and junction of weight and fire-box are to be double riveted, and all parts thoroughly stayed. There are to be no braces from side to side over the fire-box, as the form of the wagon-top is a continuous circle over the top and around the sides with proper connection and cock on boiler. Heater



Rear Elevation, and Section through Driving-Wheel.



FIRE-BOX DOOR.
Plan and Section through A B.



SMOKE-BOX.

cocks, with connections to feed pipes; blower cock and pipe to front end; petticoat-pipe of proper size, and to be adjustable; grates of standard C. & N. W. pattern, consisting of 2 stationary, 1 drop and 2 rocking grates, to be operated from the cab. A No. 8 Friedman injector, located on the right-hand side, and a pump on left side.

Cab.—To be of ash or oak; pine roof, covered with tin, substantially built and well finished; to be provided with a cab signal bell and seat boxes.

Carrying Gear.—Equalizers to be of best hammered wrought iron, pivoted on a steel gib fitted into a wrought-iron strap attached to the frame. Driving springs to be made of 9 leaves of $3\frac{1}{4}$ in. \times $\frac{5}{8}$ in. steel, and to measure 34 in. from center to center of spring hangers. Expansion buckles to be made of 6 in. \times $\frac{5}{8}$ in. wrought iron, planed and fitted accurately to the frames and secured to side of fire-box by six $\frac{3}{4}$ -in. studs in each buckle, 3 above and 3 below the frame. Angle irons to be of cast iron, 1 in. thick, planed where they rest on the frame, and accurately fitted to the side of the fire-box, and secured to it by $\frac{3}{4}$ -in. studs. Liners are to be put behind the bottom and top expansion lugs, between frame and fire-box, leaving $\frac{1}{8}$ in. play.

Cross-Heads.—To be of cast steel, wearing surface to be 15 in. long and 6 in. wide, with brass gibs; pin to be $2\frac{1}{2}$ in. in diameter, $3\frac{1}{2}$ in. long between shoulders. Cast steel pump-lug to be attached to the inside of the cross-head on left side of engine.

Crown Bars.—To be 11 in. number, made of two bars $\frac{3}{4}$ in. \times 5 in. iron, welded in pairs at each end, and resting on side sheets. There are to be ten $\frac{3}{4}$ -in. bolts with T heads to each bar, to be riveted on under side of crown sheet; crown-bar washers to be at least $1\frac{1}{2}$ in. thick, made of wrought iron, round, and tapering down toward the crown sheet, covering as little space on same as practicable; crown to be stayed by 2 braces from each crown bar to dome and outside shell.

Cylinders.—To be 17 in. in diameter and made for a stroke of 24 in.; to be made of close-grained iron, as hard as can be worked and cast solid with half of the bed-castings. The valve-seat to be 12 in. \times 17 $\frac{1}{2}$ in., the steam ports to be 1 $\frac{1}{2}$ \times 15 in.; bridges, 1 in. wide; and the exhaust port 3 \times 15 in.

The cylinders are to be accurately bored, planed and fitted to the frames and to each other. The distance from center to center of cylinders, 6 ft. 1 in. The cylinders and valves are to be lubricated by means of oilers of an approved pattern, placed in the cab with proper pipe connection to run under lagging of boiler to forward end, and to connect with top of steam-chest. Cylinders and steam-chest casings to be of sheet and cast iron, painted.

Driving Axles.—To be of the best quality of ham-

mered iron, 5 ft. 9 in. long over all; wheel seat to have a shoulder 3 in. from the outside end, which is to be 6 $\frac{1}{2}$ in. in diameter, and the inside part to be 7 in. in diameter; the journal bearing to be 7 $\frac{1}{2}$ in. long; the journal bearing and seat for eccentrics to be 7 in. in diameter, turned and finished true; and distance between face of driving-wheel hubs to be 4 ft. 7 in.

Driving Boxes.—To be fitted with collars, wedges, wedge-bolts and nuts, in exact conformity with the plans. Brasses to be 1 $\frac{1}{4}$ in. thick at the top, and made of pure ingot copper and tin in proportion as 7 to 1, and to be bored 7 in. in diameter, scraped and closely fitted to the journals.

Driving-Wheels.—To be four in number, of cast iron centers of 63 in. diameter, with steel tires of 3 in. thickness on the tread, all turned to uniform size. The length of the hub to be 7 in. and bored with a shoulder to fit the axles (which see); the length of main rod crank-pin journal $4\frac{1}{4}$ in.; diameter, $4\frac{1}{2}$ in.; length of parallel rod journal, $3\frac{1}{4}$ in.; diameter, $3\frac{1}{2}$ in.

Fire-Box.—The inside dimensions are to be, width at bottom, 35 in.; at top, $43\frac{1}{2}$ in.; length, 66 in.; height at center, 65 in. The side sheets to be corrugated vertically up to the swell of the wagon top. The fire-door opening to be 14 \times 16 in. oval, formed by flanging the inside sheet over the outside one, as shown in the plan and section, as above. The water space to be 3 in. all around the fire-box and formed by a wrought-iron ring of 2 $\frac{1}{2}$ \times 3 in. iron between box and shell.

Flues.—To be 158 in number, of 2 in. diameter outside, and 12 ft. long, of best quality lap-welded charcoal iron, to have the thickness of No. 11 wire gauge, with copper ferrules in fire-box end. Hand-hole plates, 2 $\frac{1}{2}$ in. \times 2 $\frac{1}{2}$ in., are to be put in at the bottom of fire-box in each of the four corners, located in such a manner that the water space all around can be reached with an iron rod. A hand-hole plate of same dimensions is also to be provided at the bottom of the boiler shell 12 in. back of the front flue sheet. A blow-off cock of sufficient size is also to be provided at the side of the fire-box.

Foot-Board.—To be of cast iron, with cab-seats supports bolted on, both planed and fitted to each other and to the frames.

Frames.—To be made of the best hammered iron, each frame to be composed of two parts, bolted together. The width throughout is to be 3 $\frac{1}{2}$ in. The pedestals are to be made for two movable wedges. The pedestal braces, or foot straps, to be of wrought iron fitted and bolted, and provided with slots for the wedge bolts.

Guides.—To be of steel, 3 ft. 11 $\frac{1}{2}$ in. long, 3 in. wide, 1 $\frac{1}{2}$ in. thick in the middle and 1 $\frac{1}{4}$ in. at the ends, planed and finished all over, and secured to the back cylinder head and to the guide yoke by guide blocks.

Adjustable oil-cups are to be provided on top of each of the guides.

Guide Yoke.—To be of wrought iron, 7 $\frac{1}{2}$ in. wide and 1 $\frac{1}{2}$ in. thick; to be made in one piece running across the frames as shown in the plan, as above, planed and slotted, and fastened with four bolts to the rocker boxes, which in turn are fastened to the frames with three bolts. All these bolts are to be $\frac{3}{8}$ and $\frac{1}{2}$ in. in diameter.

Pinot.—To be black on engine and tender throughout, and varnished. Lettering to be block letters and figures in gold colored paint.

Pivot.—To be of ash or oak, with diagonal or sloping bars well put together and ironed, and provided with a draw casting, well braced with a heel brace from the saddle, and set to clear the rail $4\frac{1}{2}$ in. at the front end and 4 in. at the back end.

Pistons.—To be provided with spring packing. Piston rod to be of steel, 3 ft. 9 $\frac{1}{4}$ in. long and 3 in. in diameter, with a taper fit and shoulder in cross-head, secured with a steel key $\frac{3}{4}$ \times 2 $\frac{1}{4}$ in.; piston to be put on with a key and riveted on end of rod.

Pump.—To be on left side of the engine, driven from lug on the inside of the cross-head. The pump is to have a plunger 1 $\frac{1}{2}$ in. in diameter. The feed pipe from pump back to the tank is to be of iron 2 in. inside diameter.

Rods.—Main rods to be of the best quality of wrought iron, length from center to center to be 7 ft. 11 $\frac{1}{2}$ in. Parallel rods to be of the best quality of steel, length from center to center 8 ft. 4 in. All to be furnished with straps, bolts, keys and trusses, all closely fitted. Brasses to be of best ingot copper and tin, with strips of lapped metal, as shown on detailed drawings, and accurately fitted to wrist-pins. Adjustable oil-cups are to be provided on both ends of side rods and back end of main rod.

Running Boards.—To be of wood 1 $\frac{1}{4}$ in. thick, secured to the boiler shell by wrought-iron brackets of sufficient strength.

Smoke-Stacks.—To be made throughout of steel of the thickness of No. 10 wire gauge and to have a corrugated cone of cast iron; netting to have a web with $\frac{1}{8}$ in. meshes. The dimensions of the stack are to be: Diameter of barrel, 17 in. inside; diameter at flange, 48 in.; at top, 32 in.; height of barrel, 34 in.; height from barrel to flange, 28 in.; height from flange to top, 13 in.; total height, 6 ft. 3 in., and height of top of smoke-stack above the rail, 15 ft. 5 in.

Stay-Bolts.—To be of steel, 11 in. in diameter and 4 $\frac{1}{2}$ in. apart between centers, except that there is an extra row in the center of the squares between the usual upper two rows across the sides. The 34 horizontal row from

the bottom to be drilled with holes $\frac{1}{4}$ in. in diameter for the admission of air to the fire.

Steam Pipes.—To be $\frac{1}{2}$ in. inside diameter, with ball-joint connection to saddle and crotch pipe. The dry pipe is to be of wrought iron, lap-welded, $5\frac{1}{2}$ in. inside diameter and 13 ft. 7 in. long, with ball-jointed brass sleeves riveted on each end, well-fitted and calked and connected to the front flue sheet and crotch pipe, and to the throttle pipe in the dome. The vertical end of the throttle pipe is to be provided with a balanced poppet throttle valve, to be operated by bell crank and throttle lever from the cab in the usual way.

Trunnings, etc., of Engine.—Wheel covers to be of $\frac{1}{4}$ -in. sheet iron, faced with 1-in. iron pipe; cylinder cocks, to be worked from the cab as usual. Steps are to be on the tender, with handles on side of cab, and hand rails on the tank. Draw-bar between engine and tender to be of $2 \times 4\frac{1}{2}$ -in. iron, with 2-in. coupling pins. Heavy check chains are to be provided between engine and tender, attached to foot-board of engine and front sill of tank frame. The engine frames, at the extreme forward end, are connected across by a wrought-iron brace of $1\frac{1}{2} \times 8$ -in. iron, on to which is bolted the oak bumper beam containing the casting for push-bar, and two cast-iron side brackets for pilot to bolt on to. The whole front end forward of saddle is provided with a sheet-iron covering $\frac{1}{2}$ in. thick, and braced to smoke-arch by 2 braces of 2 in. diameter in the usual manner. Engine to have a Westinghouse air pump, and brake attached under tender, with pipe and hose connections complete. All principal parts to be interchangeable, and accurately fitted to gauges and templates. All threads and bolts to be made to the C. & N. W. standard.

Trucks.—To be the 4-wheeled bogie with Allen paper wheels, 28 in. in diameter and 5 ft. 6 in. spread, to have cast iron center-bearing, to have a safety chain attached to the front bumper beam. Journal bearings 8 in. long and $\frac{1}{4}$ in. in diameter.

Valve Motion.—To be the most approved shifting link motion. The links, slide-blocks, pins, lifters and eccentric-rod jaws to be made of the best hammered iron, and case-hardened. The rocker arms and lifting shaft arms to be of cast steel. The valves are to be cast from the same cupola as the cylinders in dry sand; to be $17\frac{1}{2}$ in. long; 9 in. wide; the inside cavity 15 in. long and $4\frac{1}{2}$ in. wide; to have $\frac{1}{4}$ of an inch outside and $\frac{1}{2}$ of an inch inside lap, and $4\frac{1}{4}$ in. travel at full link. The face of the links to be $2\frac{1}{2}$ in. The eccentrics are to be put on in two halves, and to be secured on the shaft by two set-screws and key.

KEROSENE oil or naphtha, or even turpentine, will in a short time penetrate between minute crevices in joints that have been long in contact, whether bolts or nuts or steam joints. They should be ignited when possible, when the effects of heat and diffusion will soon loosen the metals. Nuts rust so tight sometimes that no wrench will remove them without breaking off the bolts. A gentle hammering on the sides and top will sometimes start them a little. A driven joint, or rust joint, between flanges, formed by cast iron borings and sal ammoniac in solution in them, cannot be parted by any means short of destroying the castings. The scrapheap is the only remedy.

A LARGER portion of the friction of engines is the result of tight cylinder packing. In setting out packing it should be only tight enough to keep the steam from passing. It is best to do this job by degrees, setting out the rings a little and then blocking the crosshead, and testing by allowing steam in the crank end of the cylinder. When no steam passes, the rings are tight enough. In cylinders that have run for some time it is impossible to make a piston tight without reboring. Care should also be exercised in making a complete revolution of the engine by hand after setting out the rings, to see that the packing does not stick in any of the smaller portions of the cylinder. An engine that requires constant lubrication in the cylinder to prevent "squeaking" needs attention, as generally the rings will be found too tight, or the cylinder out of line.

THE machine shops of the Mobile & Ohio Railroad will be removed from Macon to Okolona, Miss.



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EDITORIAL ANNOUNCEMENTS.

Addresses.—Business letters should be addressed, and drafts and money orders made payable, to THE NATIONAL CAR-BUILDER, Communications for the attention of the Editor should be addressed EDITOR NATIONAL CAR-BUILDER.

Advertisements.—Nothing will be inserted in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.

Contributions.—Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.

SUBSCRIPTIONS to the CAR-BUILDER will be received, and copies kept for sale, at the following places:

A. WILLIAMS & Co., 283 Washington Street, Boston, Mass.
L. SCHAFFNER, Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.
WILLIE H. GRAY, 306 Olive Street, St. Louis, Mo.
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NARROW GAUGE.

The following extract is from a statement by Maj. Wm. J. Sykes, published in the Nashville (Tenn.) Banner:

"This road (Toledo, Delphos & Burlington, narrow gauge) when completed to St. Louis will do an immense business, because, on account of the cheapness of its construction and its light running expenses it can afford to furnish cheap local as well as through freights, and yet make money. Its freight cars, that weigh only 5 tons, can carry from 15 to 20 tons of freight, though they usually carry only 24,000 pounds. They are 7 feet wide, and as long as the standard gauge cars. Their locomotives weigh from 10 to 24 tons, and can be made larger. Their iron rails weigh 40 pounds to the yard, while the rails on standard gauge roads weigh 60 pounds to the yard. Their passenger coaches have 22 double seats, can carry comfortably 44 passengers, and do not weigh more than half as much as a standard gauge coach."

Representations of this kind are no doubt familiar to most of our readers. If they are not mere assumptions formed from a crude knowledge of the subject, or inspired by self-interest, they should receive the attention of every business man in the country who has anything to do with railway transportation. Is it to be believed that the intelligent

projectors, builders, and managers of our great railway lines have been so short-sighted as to engraft upon the country such a costly and extravagant system as that of the so-called standard gauge, and also to perpetuate it in the face of facts like these, if facts they are? Everybody is familiar with the arguments of the narrow gauge advocates. When carefully examined they amount to little more than a skillful statement of their case, leaving the facts to be assumed or inferred. The solution of the problem is a matter of practical business concern, and should be dealt with as such, and without prejudice. Viewing it in this light, it was to be hoped that the 5,000 miles, more or less, of narrow gauge road that have been built in this country within the past eight years, a large portion of which is in operation, would by this time have developed results that would place the alleged superiority of the system over that of the standard gauge in a clearer light, and so reduce the controversy to narrower limits. This expectation has not been realized, however, and after a kind of truce between the belligerents, the old arguments are again revived, a specimen of which is given in the above extract, which says in substance, "Put your standard gauge rails $20\frac{1}{2}$ inches nearer together, and you can carry a much greater weight of freight and passengers in proportion to weight of cars and engines than you can with your rails 56 $\frac{1}{2}$ inches apart, to say nothing of cheaper rails and rolling stock, and lighter running expenses." As an abstract idea, this is excellent; but its excellence should be proved by performance and net earnings.

It must naturally occur to most people who have any experience in railroading, that as between the two gauges in question, the width of each and the weight of rails must determine the size and capacity of the engines, and that these in their turn must determine the weight of loads that can be hauled. There is no apparent reason why the proportions of dead and paying weight should not necessarily be the same in both cases, other things being equal. The longer and heavier trains of the wider gauge, with its larger and more powerful engines, require of course heavier and stronger cars, not solely for carrying the weight of load, but to resist the strains of concussion, the force of which is according to the weight of trains, including engines and tenders. All this is regulated by mechanical laws, from the operation of which neither of these gauges, with their rolling stock and traffic, is in any degree exempt. There must necessarily be a certain relative proportion between the weight of loads and of the cars which carry the loads, conditioned of course upon the size of trains, the speed with which they are run, and the efficiency of the brakes. It is well known that a common horse truck-wagon will safely carry over a good country road a load equal to four times its own weight, because it moves singly and alone, and at a very slow speed as compared with that of freight trains upon hard, smooth, level steel rails. Now, inasmuch as the cars upon narrow gauge roads are not so many common road wagons moving independently of each other, it does seem that the strenuous advocates of that system, before claiming such a large percentage of saving in dead weight, are bound to show, and to show clearly, how far and for what reasons a narrow gauge train is exempt from the conditions to which a standard gauge train is subject, as determined by its weight and speed. If there must be the same relative proportion in the former case, in order to prevent the cars from being knocked to pieces prematurely, we cannot see what is gained in the diminished size of engines and cars, and a narrower gauge; nor can we imagine what does or should prevent a 10-ton standard car from carrying twice as much load as what is claimed for a 5-ton narrow gauge car, es-

pecially as the former has to be stronger in its floor-framing in order to resist the poundings to which it is subjected in long and heavy trains. That the Denver & Rio Grande and other narrow gauge roads do really carry a larger proportion of paying as compared with dead weight, than is carried by standard gauge roads, is quite likely; but is not the life of the cars correspondingly shortened, and the cost of current repairs heavier? If not, then the conditions of which we have spoken, or rather the mechanical laws applicable to the elements of weight, strength and speed, operate differently, according to width of gauge—rigid and unyielding as to 4.8½, and elastic and flexible as to 3 feet.

What we have said has reference to these two gauges, and not to others that differ more widely. The present standard gauge is beyond question a more economical one than six feet. It has, we believe, been demonstrated that about five per cent. in power has been saved on the Delaware, Lackawanna & Western road by the reduction of its gauge to the prevailing standard. But it may be asked if the reduction of 15½ inches has saved five per cent., why not reduce it another 15½ inches and save ten per cent? The answer is that there is necessarily a limit to the narrowing process, beyond which no saving can be effected; and even if there were not such a limit as respects engine capacity, there are other considerations that would forbid any excessive reduction.

THE CONING OF CAR WHEELS.

The practice of slightly coning the face of car wheels is generally approved by railroad men for the reason that it facilitates to some extent the movement of cars around curves, by enabling the outside wheels to run on their largest diameter, and so keep a little ahead, as it were, of the inside wheels and cause less slipping. It is, however, believed by some good and capable mechanics that the advantage thus derived is not only very small, but is actually more than counterbalanced by disadvantages which would not exist if the face of the wheels were straight. If the speed of all trains were uniform, instead of varying as it does from 15 to 40 miles an hour, it would be possible to give to the outer rail of curves the precise elevation that would balance the tendency of the inner wheel flanges to press against the inside rail in consequence of such elevation, by the opposite tendency of the outer wheel flanges to press against the outside rail by the centrifugal force of the train—and vice versa. But as it is impossible to adjust all curves to all speeds, the elevations of the outside rail are adapted as near as may be to a medium between express and freight trains, so that the former will press more on the outer rail, and the latter more on the inner one.

As this pressure upon each side is unavoidable, and at best only partially obviated by coning, let us see what would be the amount of the slipping in case the treads of the wheels were straight. A railway track curve is a portion of two concentric circles, the distance between which is the gauge. No matter what may be the size of the circles, the difference in their peripheries is always the same as a circle the radius of which is the gauge; so that in a standard gauge curve, the outer rail in a complete circle would only be a fraction over 30 feet longer than the inner one. A curve on a road, however, is never complete, and does not ordinarily exceed one-fifth of a circle, in which case the slip of wheels would be only six feet, supposing they were not coned.

In slow-moving freight trains, the elevation of the outer rail causes the inner wheels to run on their largest instead of smallest diameter on the inner rail, and this, of course, prevents the out-

side wheels from running on their largest diameter on the outer rail, thus causing more slipping to get round the curve than if there was no coning. If this view of the subject is correct, the advantage of coned wheels would seem to be limited to fast-running passenger trains. But even in this case, it is maintained that the coning is injurious to the straight track, by causing the wheels after leaving a curve to run on their largest diameter, first on one rail and then on the opposite one, and thus producing an oscillation unpleasant to passengers and injurious to the track.

The expediency of coning all car wheels will probably remain an open question for a good while yet, for the reason that the practice is universal, or nearly so, and there is no way of getting at comparative results; but with respect to roads where the prevailing curves are of large radius, there can be little doubt that the use of wheels with straight treads would be attended with advantages that would a great deal more than offset the benefits derived from coning.

ENGLISH COMPARTMENT CARRIAGES.

It is hardly to be expected that the murder of a passenger on an English express train while in transit between London and Brighton will lead to any immediate abandonment of the compartment system in the construction of English railway carriages. Although this is not the first tragedy of the kind that has occurred, the inciting cause of which has been due to the isolation inseparable from such a system, it will doubtless be looked upon as a thing so very rare and exceptional as to give little occasion for alarm, or for the making of any radical inroads upon the privacy and exclusiveness of which the higher grades of English society are so tenacious. Of what account, it may be asked, are two or three murders or hair-breadth escapes when compared with the millions of people who travel unmolested? Why break down the social barriers that have remained intact during successive dynasties in order to lessen infinitesimally the risk of personal violence in railway cars? We are inclined to think that the great mass of intelligent well-to-do people in England will look at the matter, unconsciously it may be, in a light something like this, until they are shocked by another occurrence of a like nature. The compartment system, with its isolation, inconveniences and absurdities, will in the mean time be adhered to, and perhaps continued indefinitely. While we on this side of the Atlantic prefer our own spacious saloon cars, which always have people enough in them to insure mutual protection, with free communication at all times with the other cars of the train, we must at the same time admit that there are conditions peculiar to individuals and nations which must be well considered before we condemn methods and practices that exist from them, and are regulated by them. Compartment cars are one of the characteristic features of English life, and cannot be wholly set aside because they incidentally afford facilities for robbery and murder while trains are passing through long, dark tunnels. It can only be done by such a change in national sentiment and traits of character as will sanction the innovation and sustain it.

The fact that successful robber raids have in several instances been made upon trains of American cars in the wide and sparsely settled regions of the far West, does not militate against the cars, but results from the insecurity which necessarily accompanies the absence of population. This state of things, however, is only temporary, and will cease as the country becomes more thickly settled, and the primitive condition of things gives place to the supremacy of law and order.

THE RUNNING OF SUNDAY TRAINS.

The Sunday traffic on the New York, Pennsylvania & Ohio road has, by an order of the superintendent, been restricted to regular mail or through passenger trains, and to such freight trains as may have started from terminal stations before Sunday morning, or which carry live stock or other perishable property.

This, it must be admitted, is about all that can be done to limit railway traffic on Sunday. The mails must not be detained, nor through passengers, neither can the companies afford to incur liability for damage to freight by its detention. Laws may be passed in certain States imposing more rigid restrictions, or attempts may be made to enforce dead-letter enactments; but no legislation will in the long run be of any avail upon this subject that does not harmonize with the prevailing public sentiment. The very nature of railway transportation makes it in its great leading features a public necessity. Even the large class of people who are averse to engaging in their ordinary pursuits on Sunday from a feeling of religious obligation admit this, but would discriminate between what is absolutely a necessity and what is not. But the trouble is that hardly two persons can agree where to draw the line. So long as the running of Sunday trains is merely condemned in the abstract; so long as the great mass of church-going people make but a feeble protest against it, and are ready to avail themselves of such trains in emergencies of sickness or funerals, and who never think that their Monday morning letters have reached them all the quicker for traveling on Sunday—so long as this is the case, there is no use in blaming managers or in pleading for a weekly day of rest for train hands and others of the rank and file of the great army of railway employees. Sunday excursion trains have not heretofore been considered a necessity—are not now, indeed, strictly so considered—but they soon will be. Road managers may in their consciences think it very wrong and even wicked to allow such trains to be run, but they are in this matter as much the instruments of the great exacting public as the train hands are of the managers. And besides, a railway manager must not show a lack of enterprise or fall behind his competitors; and what is with him more important than all, he must not disappoint the stockholders. He is a creature of circumstances, his discretion is limited, and does not extend to matters of religious faith and belief. A commanding public sentiment can alone check railway encroachments upon Sunday observance; but so long as those who are the most outspoken against such encroachments will readily patronize Sunday trains in certain emergencies, justifying the *patronage* on the score of necessity, but not the running of the trains, there is little prospect of holding the evil in check, much less of getting rid of it altogether.

ALTHOUGH the subject of car heating is just now a little unseasonable, we take pleasure in calling attention to a new hot-water heater and automatic fire extinguisher that has recently been perfected by the Searles Heater Co., of Cincinnati. Except from hearsay, we do not know that it is any better or cheaper than those—or perhaps we should say the one—now in use. There is some gain, however, if it costs no more and is just as good, because with two monopolies instead of one the profits will be more widely distributed, and the chances for a break in the market some time or other considerably increased. It is said that the new heater is ornamental and compact in form, will not explode, and that it can be run with hard or soft coal at a cost of not more than ten cents a day. Hitherto the heating of sleeping and

drawing-room cars with hot water has involved an expense far exceeding the cost of the apparatus. It is time the roads were relieved of the burden by a reduction of the cost to reasonable limits.

If the thousand unreasoning animals designated as live-stock, and which are liable to be subjected to the miseries of railway transportation, could be made aware of the efforts put forth to alleviate their sufferings during transit, their gratitude would no doubt be very great. To say nothing of 600 models and plans presented by the competitors for the \$5,000 prize offered by the American Humane Society, new patents for alleged improvements in stock cars are granted every few days, and with every indication that the end is not yet. The committee appointed to examine these models and plans and determine as to their respective merits may well shrink aghast at the magnitude of the undertaking; yet we hope they will resolutely face the music and fish out from the heterogeneous mass the best single specimen of the lot and hold it up for the admiration of the Humane Society and the rest of the world. Here is a chance at least for uniformity, not to say perfection, in cattle cars. The climax may not be reached for a year or so, but if there is no flinching on the part of the committee it is a dead sure thing.

Some New English Railway Carriages.

The following description of some new carriages that are in course of construction for the London & Brighton Railway is from the *London Railway News*:

The height of the three classes is 6 ft. 3 in. from the floor to the spring of the roof hoops. The first-class carriages have spring-stuffed seats and backs, and are upholstered in blue cloth, trimmed with blue and white lace. A deep fringe under the front of the seat reaches nearly to the rug. The floors are covered with oil-cloth, and the center with a thick pile Axminster rug, with a rich border, and the arms of the company in the center. The internal framing is of walnut, with polished sycamore panels, and gilt moldings in the angles. The elbow rests are hinged, upholstered with blue cloth on the under side, and with blue morocco leather on the top. Each compartment has three mirrors on each side, 2 ft. long by 10 in. wide, with rounded corners. The first-class carriages are 6 ft. 8 in. between the perpendiculars from back to back; the seconds are 5 ft. 8 in., and the thirds 5 ft. The first-class seats are 1 ft. 10 in. wide; thirds, 1 ft. 3 in., and the seconds of intermediate width. The second-class carriages are lined with polished mahogany above the back stuffing and on the roofs, which have oak ribs and gilt moldings in the angles. The floors are covered with oil-cloth, and have cocoa rope mats in the middle between the seats. The third-class carriages have plate glass side lights, 2 ft. 3 in. by 16 in., and spring blinds of figured rep for door and side lights. They have ventilators over the doors, belts of stuffing at the back, and spring stuffed seats. Windows and doors are framed in mahogany; the fronts of the seats are also of mahogany; the remainder of the wood-work is grained for oak, except the roof, which is painted in cream color. All the carriages are fitted with Stroudley & Rushbridge's patent communication between passenger and guard. The doors are supplied with spring catches and are hung upon very strong brass triple butt hinges. The exteriors of the carriages are of Honduras mahogany, highly varnished and well rubbed down between the coats. The outside panels have gilt borders in each class of carriage, and all the bolt heads and outside iron work are gilded.

The company have also several kinds or classes

of saloon carriages. Their width is 7 ft. 9 in. They contain a smoking compartment occupying 3 ft. 9 in. of the car's length, and having three seats (smokers be thankful!). The gentlemen's room is 13 ft. 6 in. long, the couches upholstered in green morocco, window blinds of embossed silk, and a walnut table. The ladies' boudoir is 10 ft. 6 in. in length, and is quite a gem in its satinwood framing, its roof of quilted white figured satin, its window blinds of gold and white satin, its numerous corporate and other heraldic devices and rich delicate trimmings. It is furnished with a couch, three easy chairs, and a table, all of walnut, richly carved. Each saloon has a handsome clock and a barometer. The end compartment, 7 ft. 9 in. by 4 ft., is an elegantly fitted lavatory.

In some of these carriages there is a saloon for the use of invalids, containing a "grasshopper couch," movable in almost all directions, so as to allow the invalid a wide range of choice as regards position. The entrance door of this saloon and the doors communicating with the lavatory are made wide enough to allow the passage of the couch and its occupant. In addition to the invalid's bed there are in the saloon a couch and three easy chairs in green damask. The lights are of embossed plate glass surrounded by a Greek border. Adjoining is a compartment that will accommodate eight friends, or attendants, and beyond this a compartment for luggage. This carriage is not, of course, used by invalids exclusively.

Poor's Manual of Railroads for 1881.

The volume for the current year has just been published. It is somewhat less bulky than its predecessor, but equally comprehensive. In addition to the mileage, operations and financial condition of each road, there is an elaborate article on the internal improvements and commerce of the country, with a review of the alleged monopoly of railroad corporations; also a list of roads that have been merged into other lines, and statements of the national and State debts.

The following figures show the increase in construction, operation, earnings and equipment during the year 1880, or more strictly speaking, up to the close of the annual reports, some of which do not cover the whole year, but only to June or September. The total mileage at the close of 1880 was 93,071 miles, which is an increase of 7,174 miles since 1870. Of this increase, 5,623 miles are in the Western States, including Texas, the Indian country and New Mexico. The gross earnings of all the roads whose operations have been reported are \$615,401,931, being an increase of \$86,389,952 over those of the previous year. The net earnings are \$255,193,436, being an increase of \$35,276,712. Of the gross earnings, \$467,748,928 were from freight, and \$147,653,003 from passenger traffic, being an increase of \$81,072,820 from freight, and \$5,316,812 from passengers. The dividends were \$77,115,411, being an increase over 1879 of \$15,454,941.

The footings of equipment show an increase over 1879 of 865 locomotives, 780 passenger cars, 267 baggage, mail and express cars, and 59,165 freight cars. These figures are of course not strictly accurate, nor are they an indication of the number of new cars and engines built during the year, as a considerable quantity of old stock must have gone out of service and been replaced by new.

The new volume is identical in style with its predecessors, and is in all respects the best, and in fact the only manual of the kind extant.

HE THOUGHT IT WAS "HYSTID."—An old farmer was coming down the Ulster & Delaware Railroad on the 11:30 train the other morning, and he was chewing tobacco with a will. He sat with his back partly turned to the window, and supposing the window was opened, he partly turned his head and emitted about a pint of tobacco juice against the glass. He looked surprised and hastily tried to cover the spit with the palm of his hand, but there was so much that it would take a bedquilt almost to hide it. The juice streamed down the window and out into the aisle of the car, and as

the little stream was seen trickling along a general titter ran around the crowd of passengers, and the old man confusedly said to a passenger: "I thought it was hystid."—*Kingston Freeman*.

THE car works of Pardee, Synder & Co., at Watsontown, Pa., are being enlarged by an addition to the wood-working shop 50 x 60 feet. The blacksmith shop has been nearly doubled in size.

THE Pennsylvania Railroad Co. have closed a contract for the equipment of their freight cars with the Van Liew gram car door. These doors have been in use on the lines of the Pennsylvania Company west of Pittsburgh for three or four years. They are being put upon a large number of new cars at the Lebanon Car Works, and by W. C. Allison & Co., Phila., and M. Schall, York, Pa.

REED'S PORTABLE ELASTIC NON-CONDUCTING COVERING for boilers, steam, hot air, gas and water pipes, is a homogeneous compact felt, about an inch thick, and weighing about one pound to square foot of finished surface. It is indestructible at any steam temperature, and is a better non-conductor at $\frac{1}{4}$ of an inch in thickness than any other material $\frac{1}{2}$ inches thick; will not fracture, crack or crumble, and is not affected by contraction, expansion or jarring of passing steam through pipes. Awarded first and only premium by Pittsburgh Tradesmen's Industrial Institute, in 1879, beating all competitors as a non-conductor. It is low priced and durable. H. C. Bradley & Co., sole agents, Chicago.

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Baltimore & Ohio.—Mr. B. Dunham has been appointed General Manager of the Central Ohio, Lake Erie, Strasburgville and Chicago Divisions. He was formerly Superintendent of the Montgomery & Eufaula road.

Cairo & St. Louis.—Mr. R. M. Pringle has been appointed Master Mechanic, vice G. W. Prescott. Mr. Pringle has heretofore filled a similar position on the Illinois Midland.

Chesapeake & Ohio.—Mr. A. S. Emmons has been appointed Purchasing Agent, vice J. A. Netherland.

Chicago, Burlington & Quincy.—Mr. E. Ryder, heretofore Assistant Superintendent, has been appointed Superintendent of Galesburg Division, vice H. Hitchcock.

East Tennessee, Virginia & Georgia.—The organization of this road now includes the Clinch, Gap & Charleston, which will be the N. Carolina Division; the Knoxville & Ohio, which will be the Ohio Division; the Selma, Rome & Dalton, which will be the Selma Division; the Alabama Central, which will be the Alabama Central Division, and the Macon & Brunswick, which will be the Macon & Brunswick Division.

Illinois Midland.—Mr. J. G. Clifford has been appointed Master Mechanic, vice R. M. Pringle, who has gone to the Cairo & St. Louis. The office of Purchasing Agent has been abolished.

Louisiana Western.—Mr. C. A. Burton has been appointed Superintendent. He is also Superintendent of the Texas New Orleans road.

Midland, of New Jersey.—This road has become a part of the New York, Susquehanna & Western, and all business will hereafter be done in the name of the latter road.

CONTINUOUS DRAW-BAR PATENTS.

The following circular has been issued by the Secretary of the Western Railroad Association:

CHICAGO, Sept. 9, 1880.

To the Members of the Association: GENTLEMEN: Claims have been pending for several years that the Continuous Draw-Bar sold by the Continuous Draw-Bar Company under the Middleton and the Griffith and Paterson patents is an infringement of patent 71,585, granted 24 December, 1867, reissue No. 5,055, granted 19th February, 1878, to Edward L. Caura.

The Association has continuously advised against entering this claim, but to quiet all questions, and at our instigation, the Continuous Draw-Bar Company has recently purchased the Caura patent, its owners inserting in the assignment a full and absolute release to all the members of the Eastern and Western Railroad Associations from any and all liability for, or on account of, any infringement heretofore of said patent.

Yours truly, J. H. RAYMOND, Secretary, etc.

AUGUST, 1881.

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Mr. E. Ryder, heret-
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Division, vice H. Hinch-

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BAR PATENTS.

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renewed, inserting in the pa-
tent to all the holders of
and associations from any and
all infringements hereafter
by infringers hereafter.

RAYMOND, Secretary, etc.

AUGUST, 1881.]

THE NATIONAL CAR-BUILDER.

ix

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BALTIMORE & OHIO RAILROAD CO., N. S. Hill, Purchasing Agent, Baltimore Md.
CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.
CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Hamer, Purchasing Agent, Chi-
cago, Ill.
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.
SAUGATECK RAILROAD CO., G. W. Bosch, Superintendent, Watervliet, Conn.
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perintendent of Motive Power, Wilmington, Del.
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UNION PACIFIC RAILROAD CO., A. D. Clark, Purchasing Agent, Omaha, Neb.
KANSAS
CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent
Chicago, Ill.
LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Muhl, Purchasing
Agent, Louisville, Ky.
GRAND TRUNK RAILWAY N. Wall, Port Huron, Mich.
LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little
Rock, Ark.
GILBERT & RUSH CO., Troy, N. Y.
WASON MANUFACTURING CO., Brightwood, Mass.
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We make any desired shades, if only being necessary that purchasers furnish us with sample of color desired, stating the time they would like to have the paint dry in.
We shall be glad to furnish samples and give prices to any who may wish to avail themselves of the above advantages.

Very respectfully,

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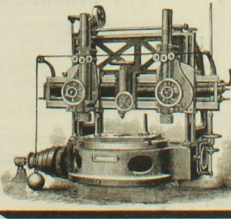
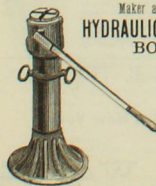
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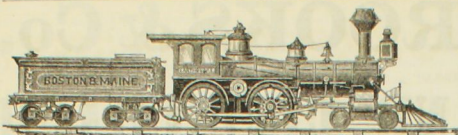
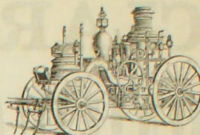
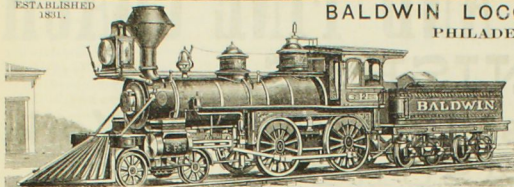
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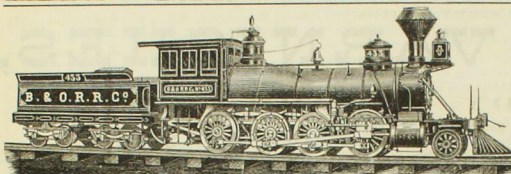
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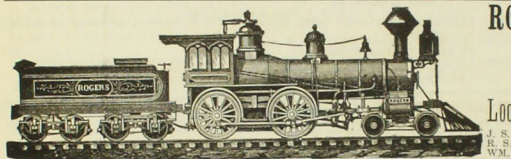
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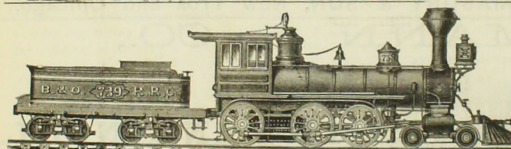
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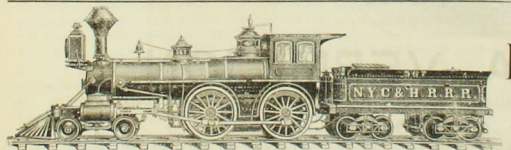
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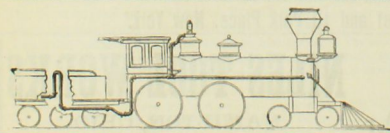
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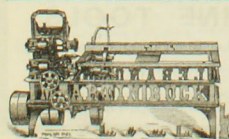
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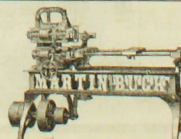
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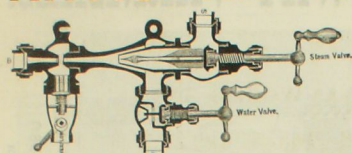
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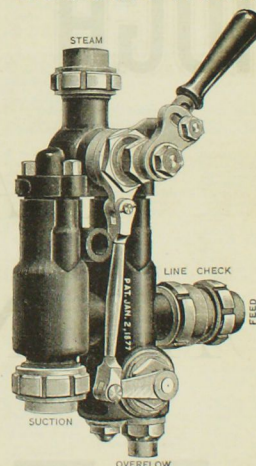
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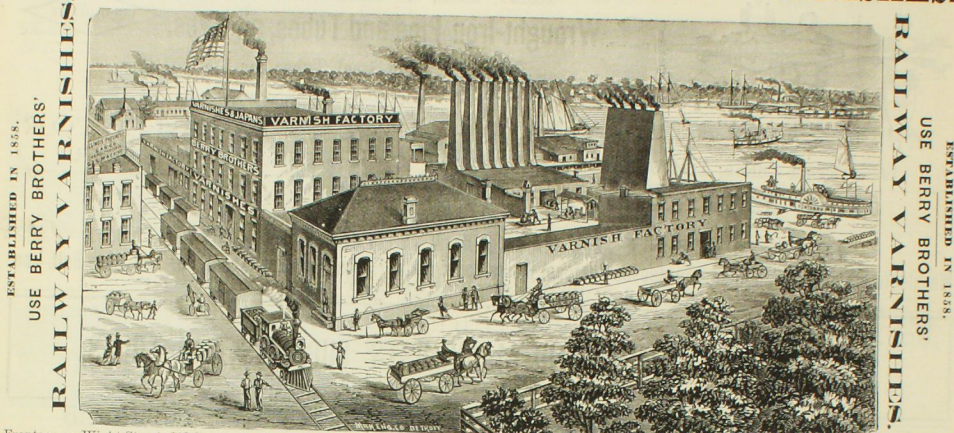
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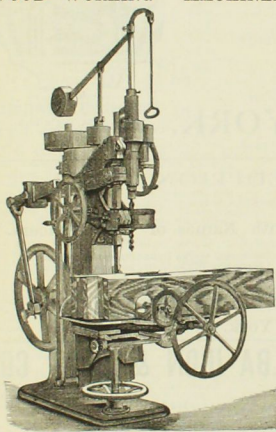
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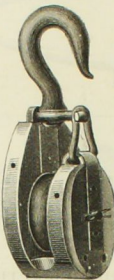
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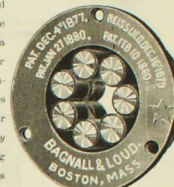
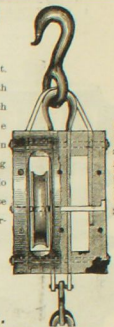
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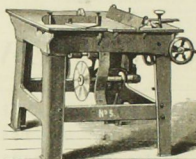
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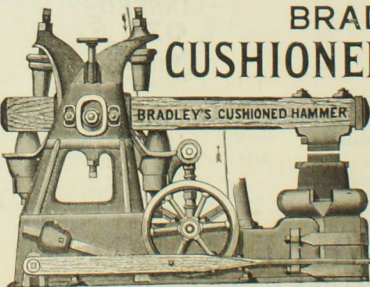
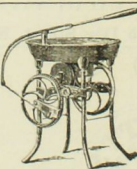
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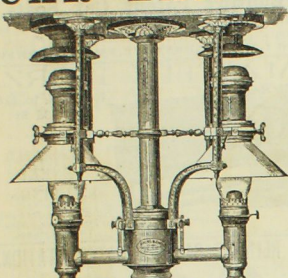
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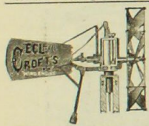
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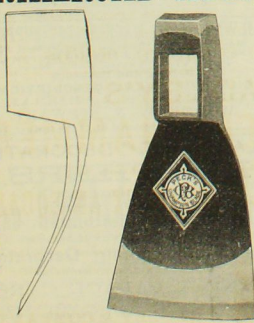


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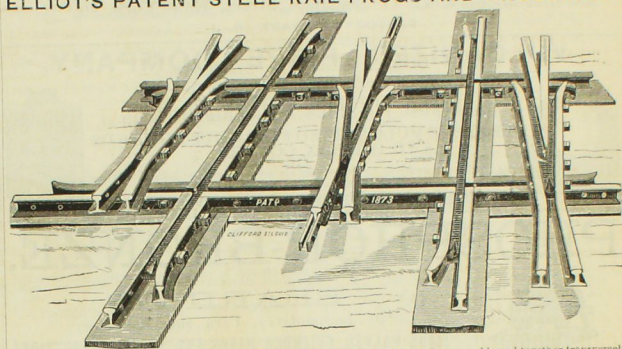
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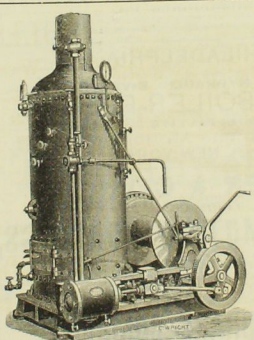
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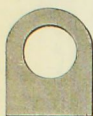
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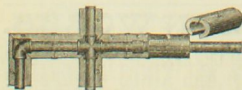
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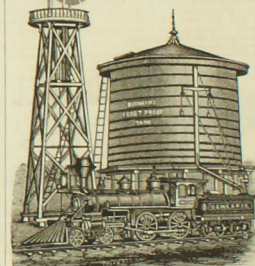
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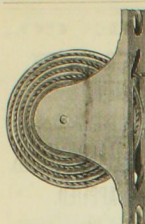
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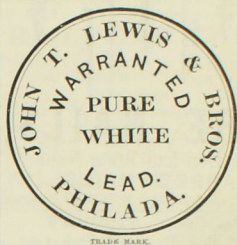
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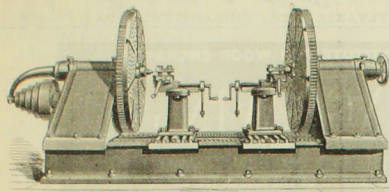
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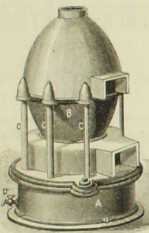
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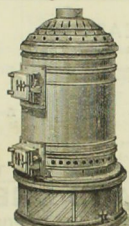
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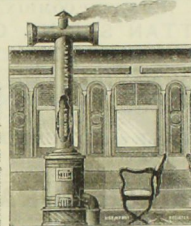
NO. 1.

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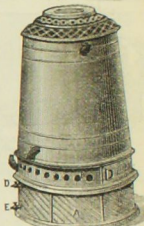
NO. 2.

No. 3. - Designed for ventilation for all cars, the registers are placed throughout the car, and the stove registers are placed at the top of the car, thus keeping the air out at the top of the car, and the registers are placed at the bottom of the car, thus keeping the air in the car.



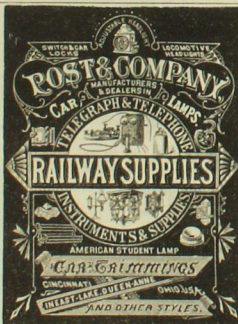
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BAKER HEATER, No. 4. - Stoves, as set up in cars, and will heat either 100 or 200 cubic feet of coal or coke. Price of No. 4 and 5, \$25.00. No. 6, \$30.00. This does not include the cost of the car, but the stove is sold separately.

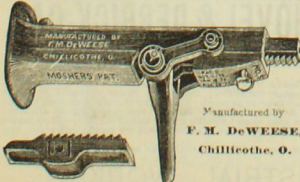


NO. 4.

It has proved a great success as a heater, on account of the very large volume of air heated. It also fills the great desideratum so long sought for, perfect ventilation during the summer by discharging a constant stream of cold air through the registers, keeping car free from dust and stinks.



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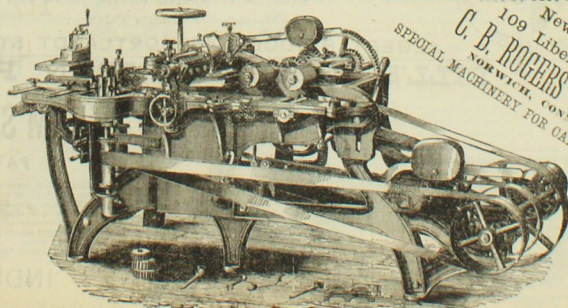
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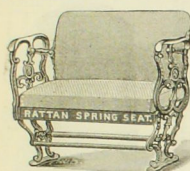
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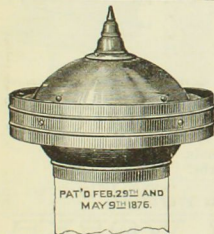
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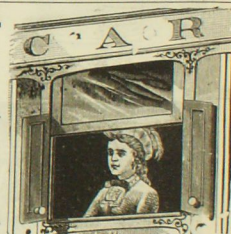
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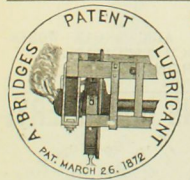


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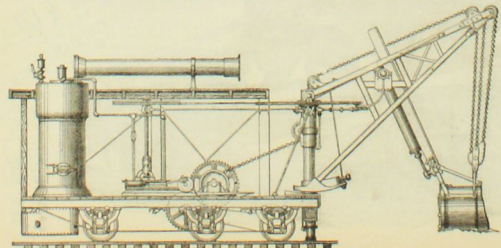
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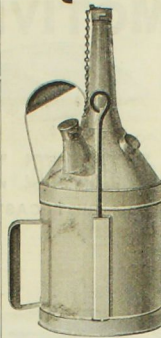
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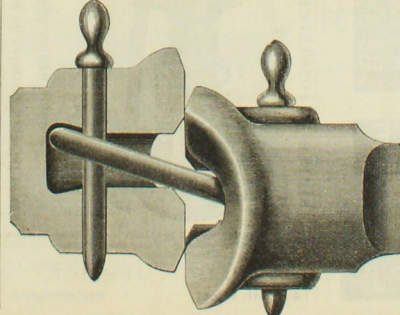
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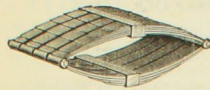
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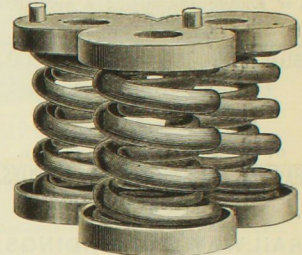
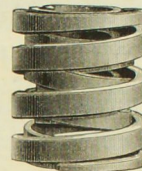
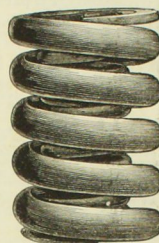
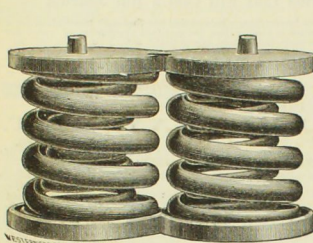
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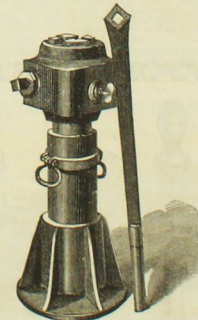
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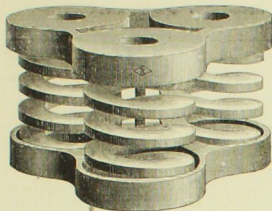
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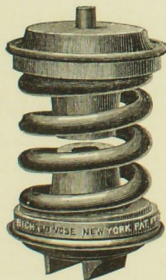
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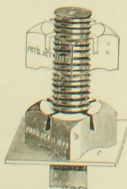
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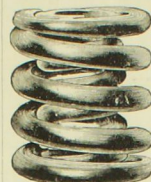
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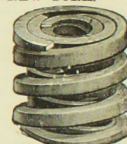
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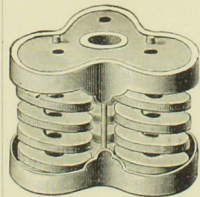
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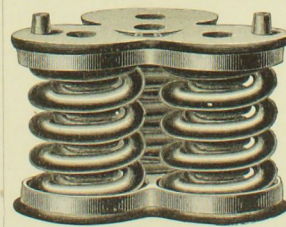
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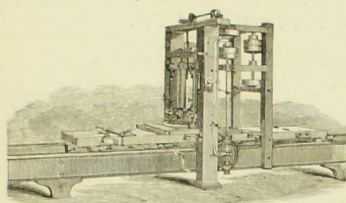
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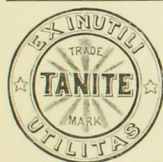
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